FIG. 1 (a)

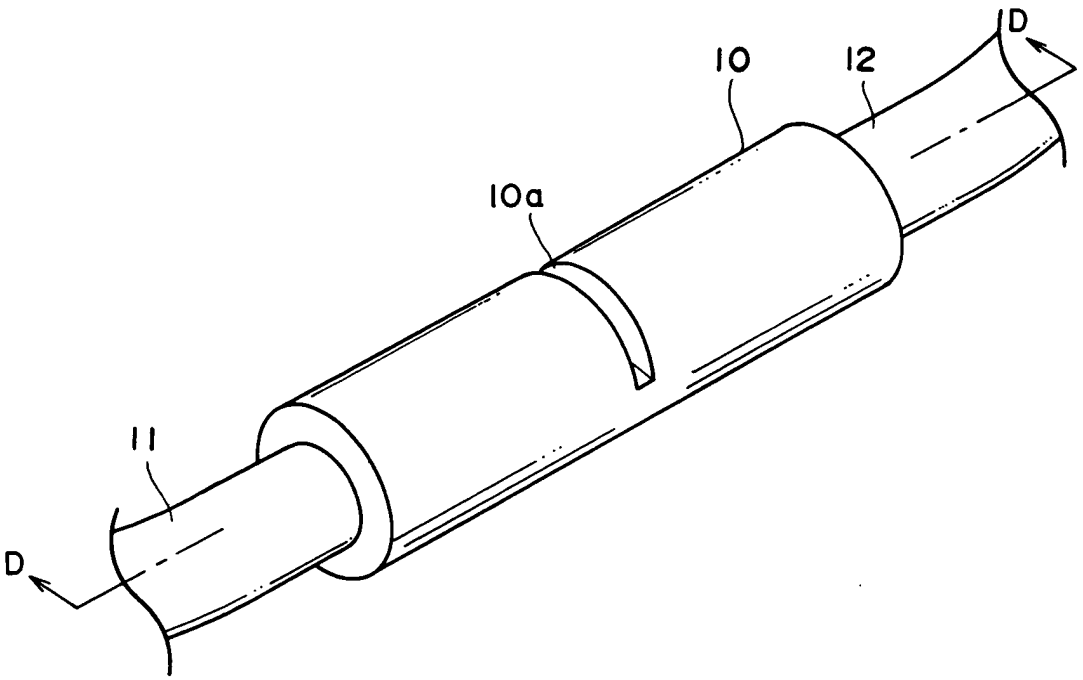


FIG. 1 (b)

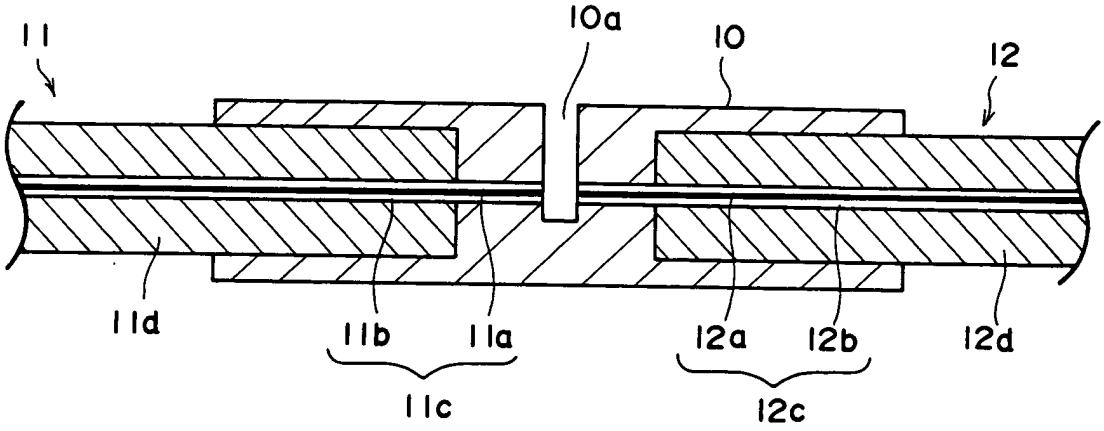


FIG.2 (a)

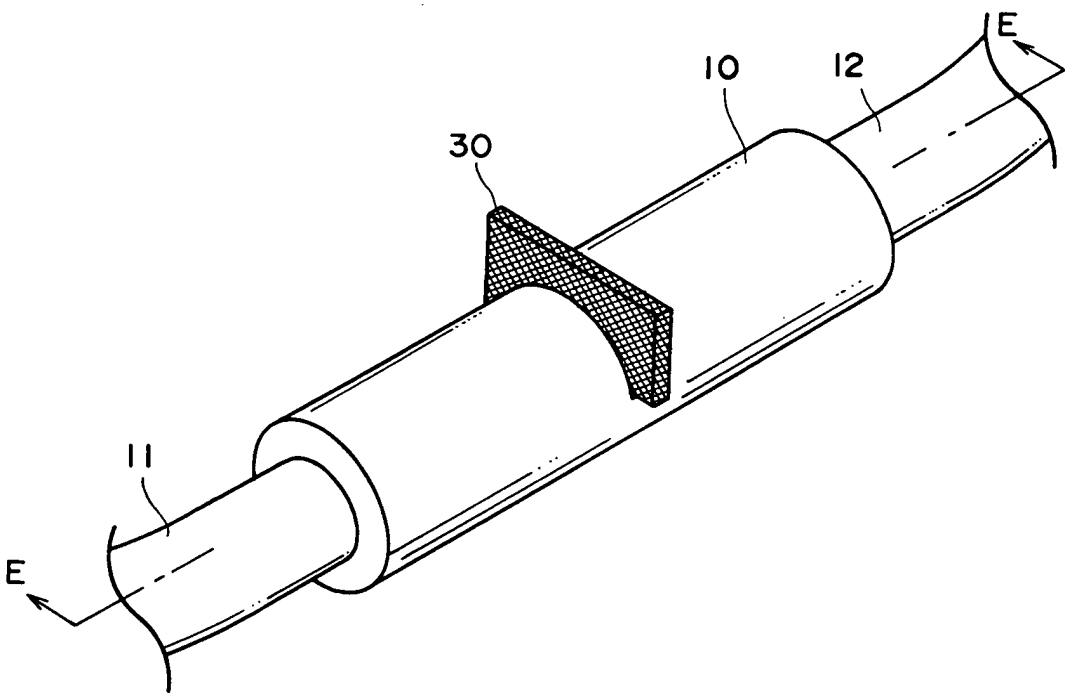


FIG.2 (b)

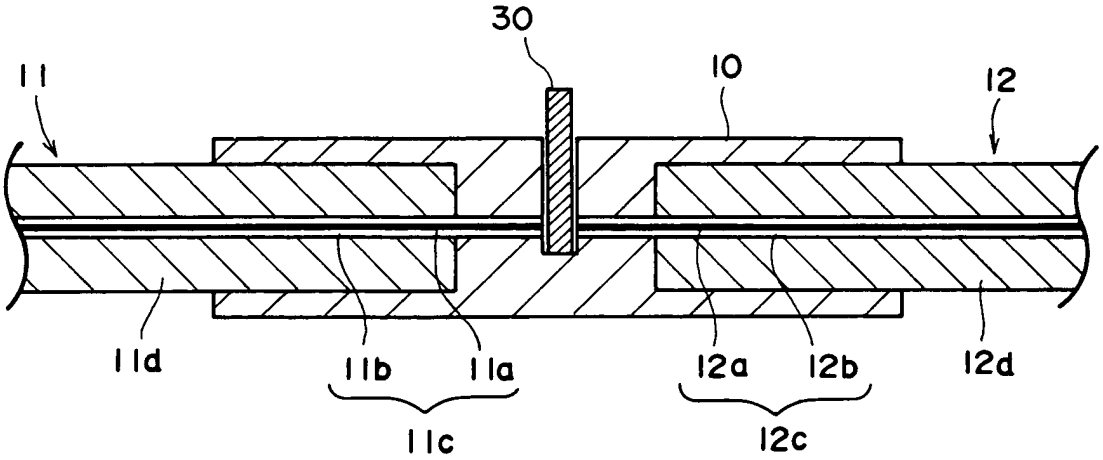


FIG.3 (a)

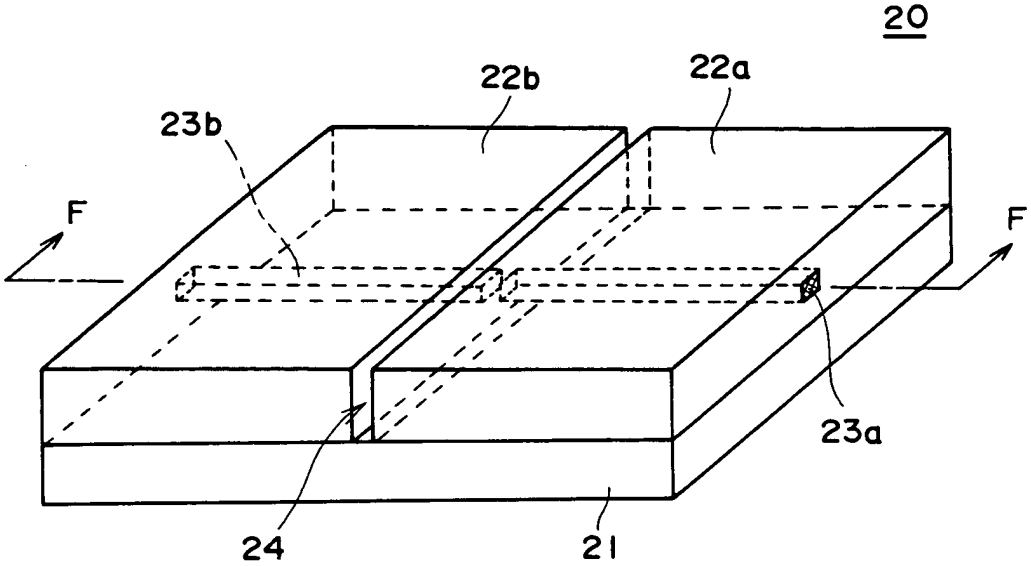


FIG.3 (b)

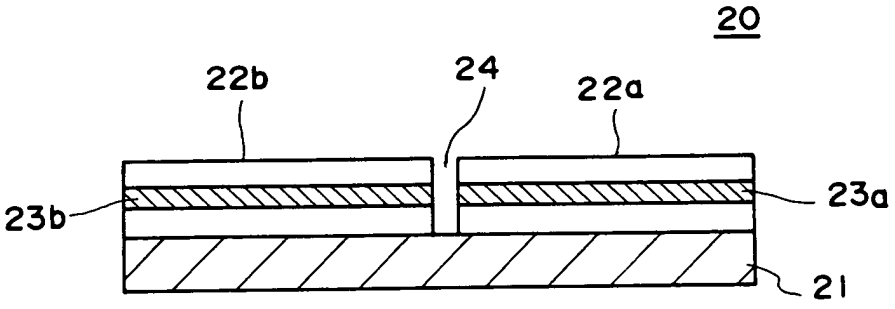


FIG.4 (a)

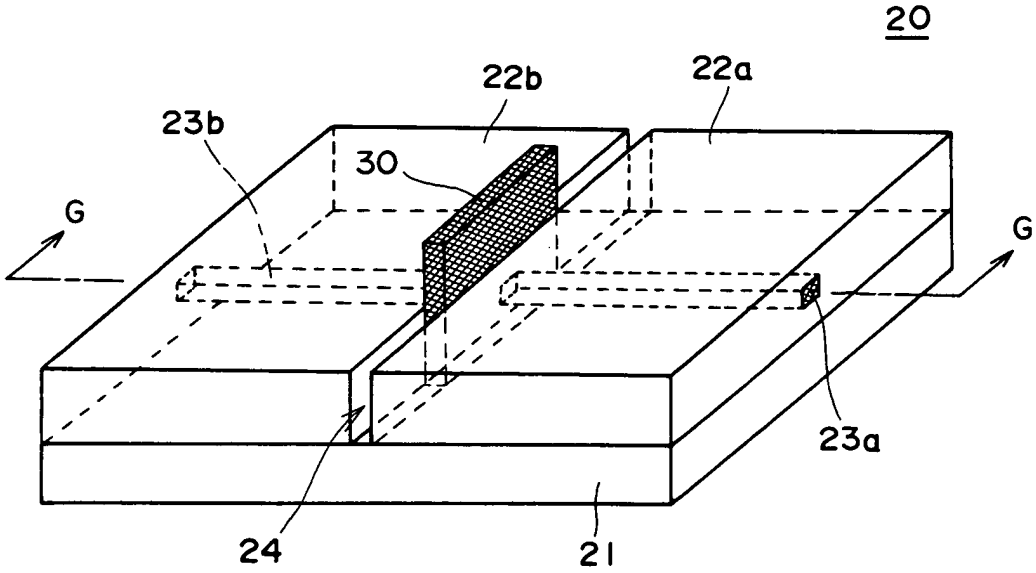


FIG.4 (b)

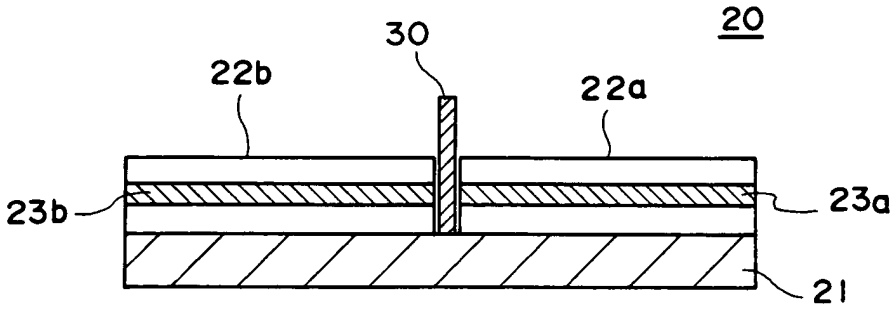


FIG.5 (a)

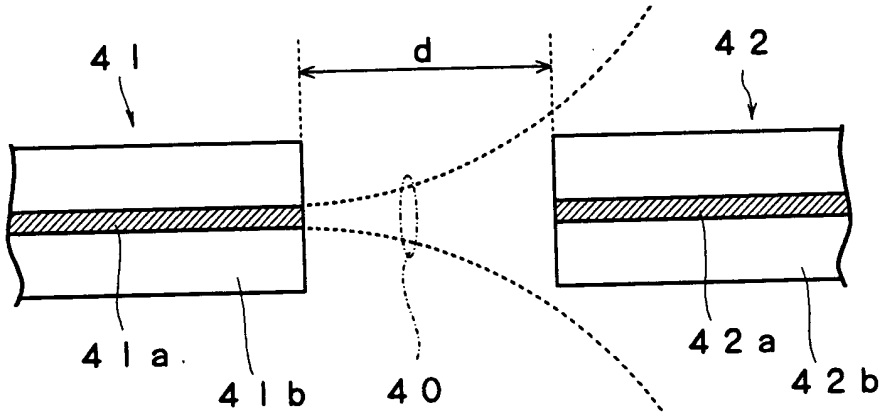


FIG.5 (b)

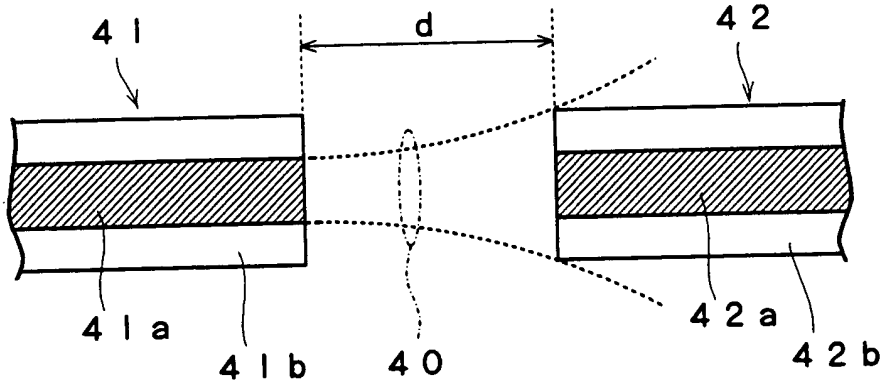


FIG.6

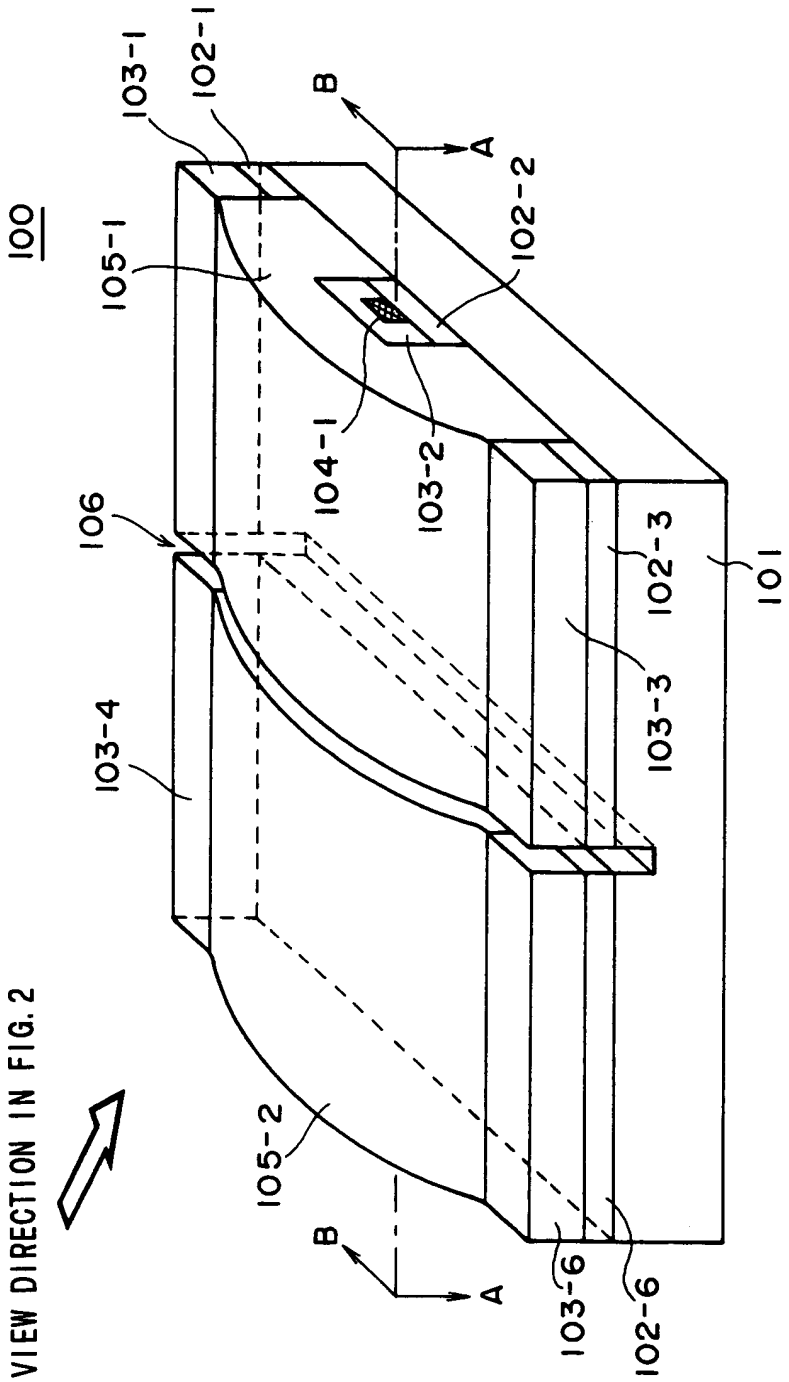

100
103-1
102-1
B
A
102-2
105-1
104-1
103-2
106
102-3
101
103-3
103-4
105-2
B
A
103-6
102-6
VIEW DIRECTION IN FIG. 2

FIG. 7

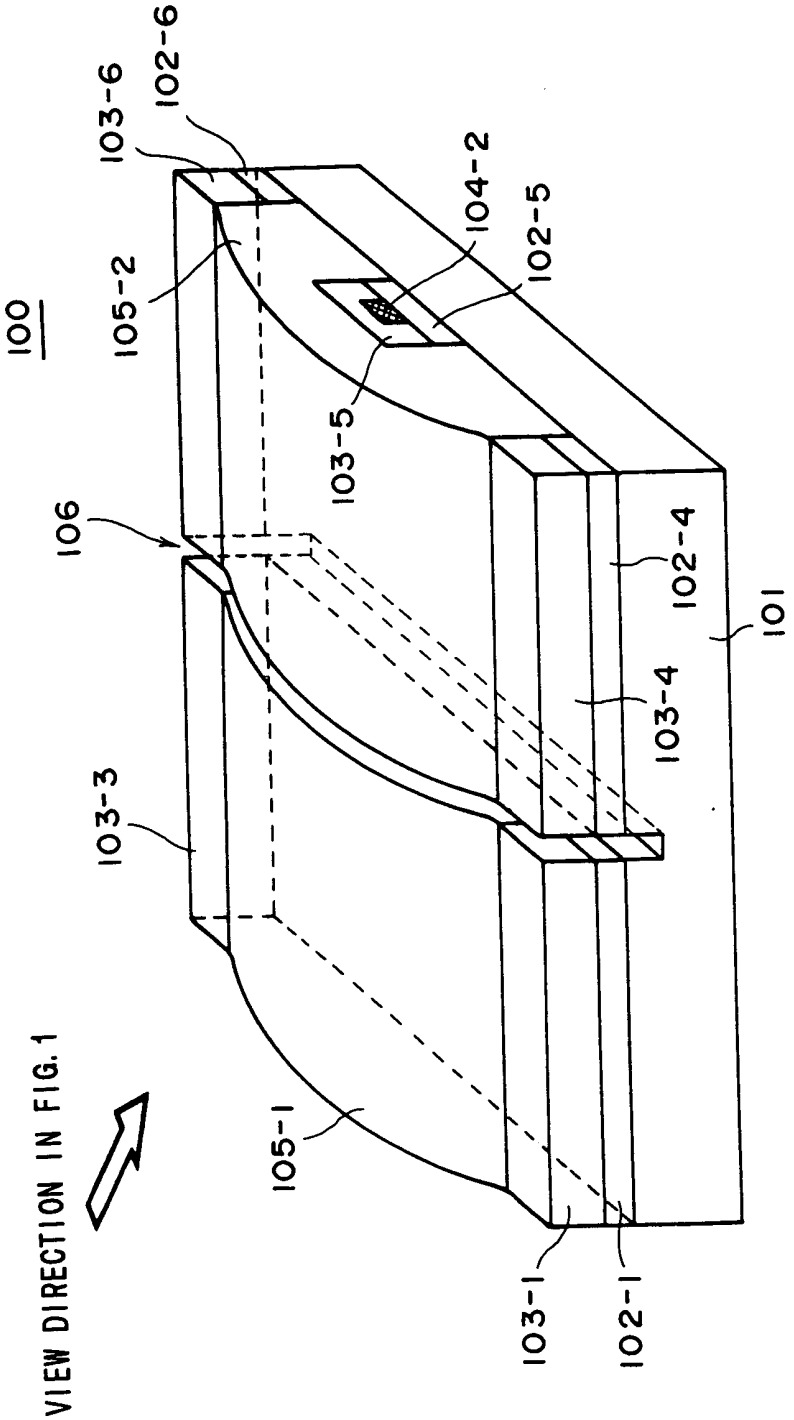

100
103-6
102-6
105-2
104-2
102-5
103-5
106
102-4
101
103-4
103-3
105-1
103-1
102-1
VIEW DIRECTION IN FIG. 1

FIG.8

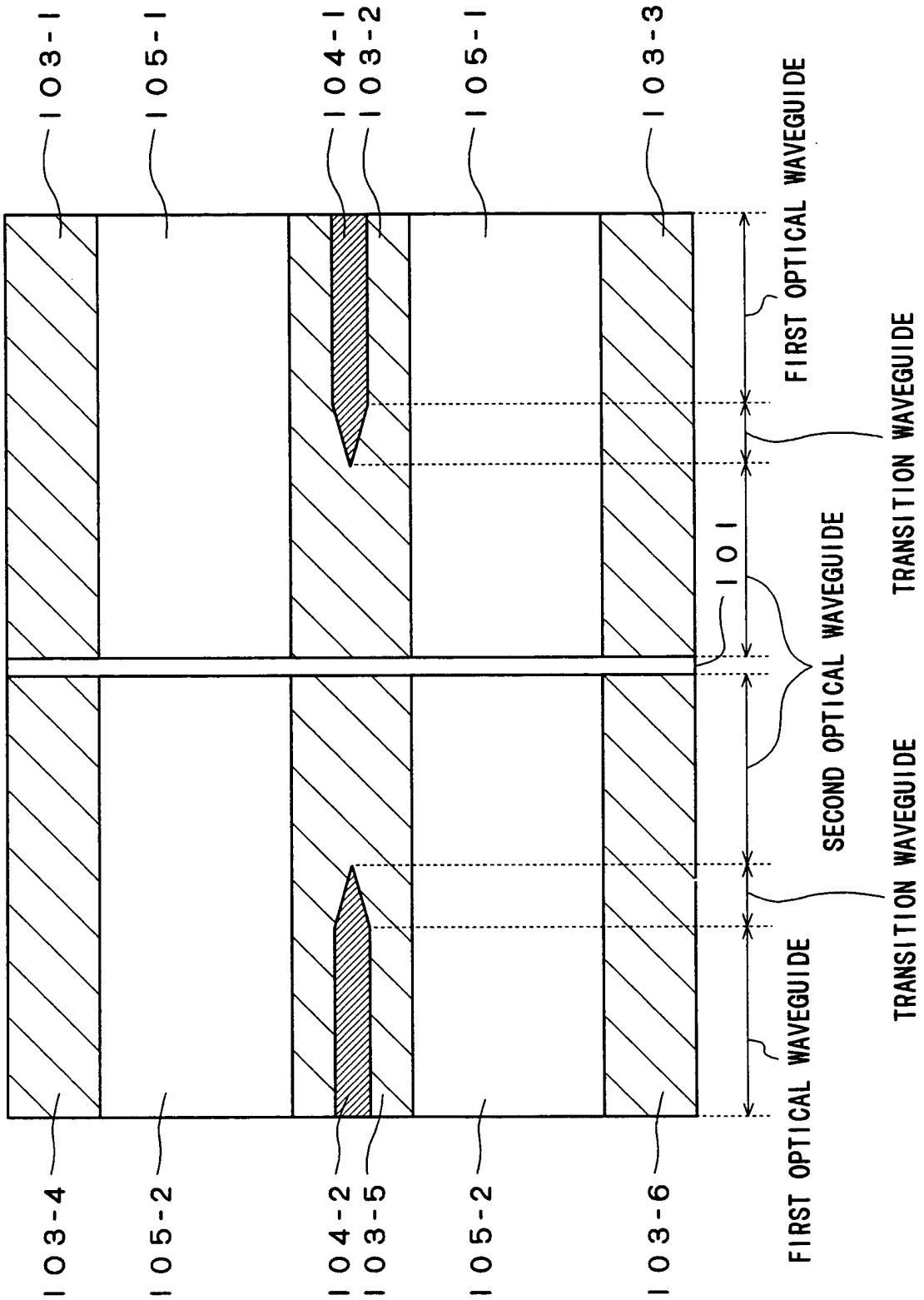

106
103-1
105-1
104-1
103-2
105-1
103-3
101
103-4
105-2
104-2
103-5
105-2
103-6
FIRST OPTICAL WAVEGUIDE
TRANSITION WAVEGUIDE
SECOND OPTICAL WAVEGUIDE
TRANSITION WAVEGUIDE
FIRST OPTICAL WAVEGUIDE

FIG.9

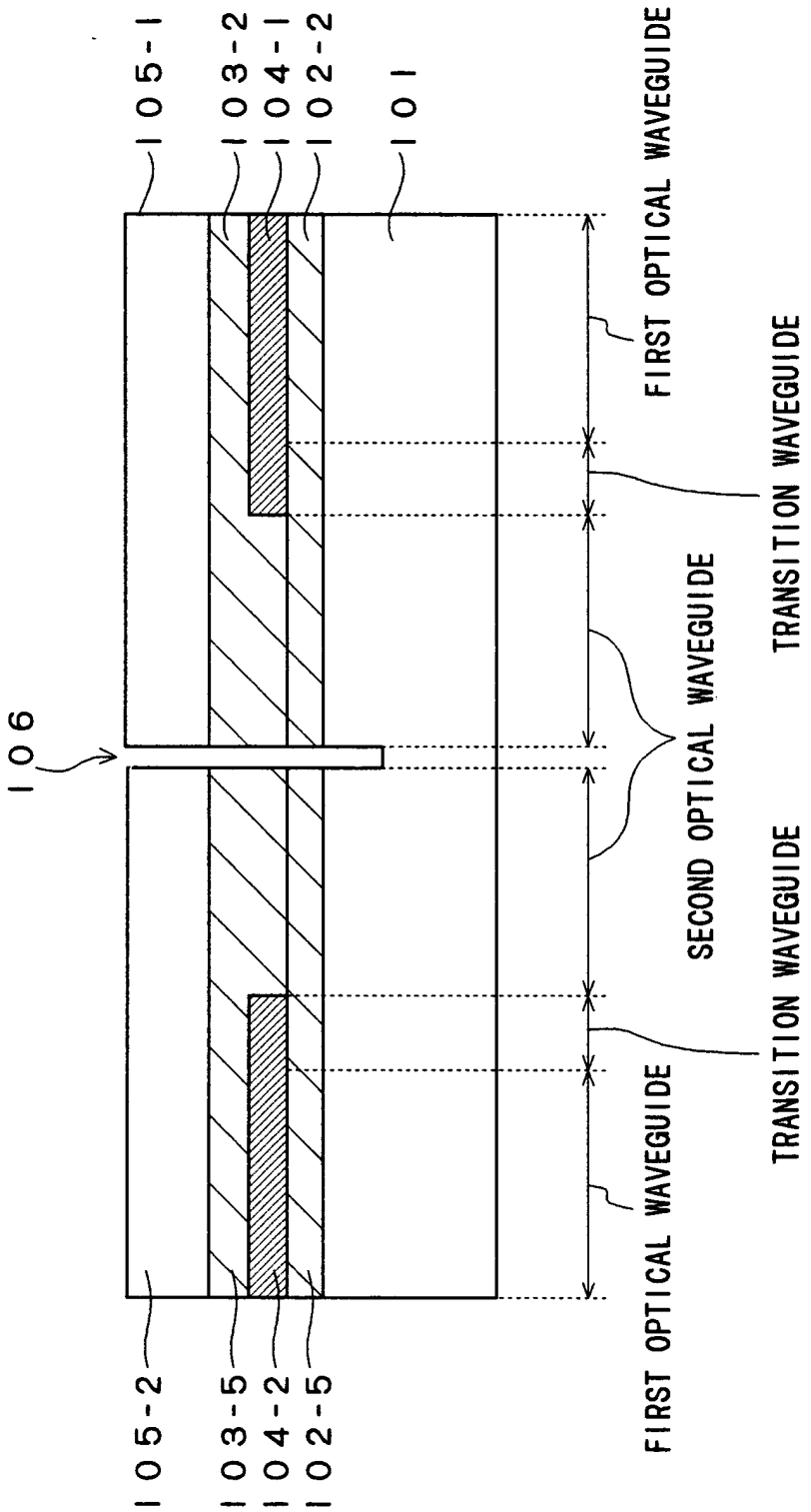

105-1
103-2
104-1
102-2
101
106
105-2
103-5
104-2
102-5
FIRST OPTICAL WAVEGUIDE
TRANSITION WAVEGUIDE
SECOND OPTICAL WAVEGUIDE
TRANSITION WAVEGUIDE
FIRST OPTICAL WAVEGUIDE

FIG. 10

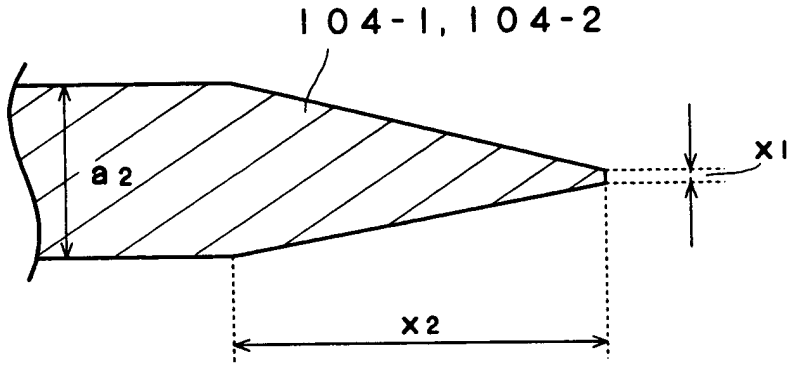

104-1, 104-2
a2
x1
x2

FIG. 11

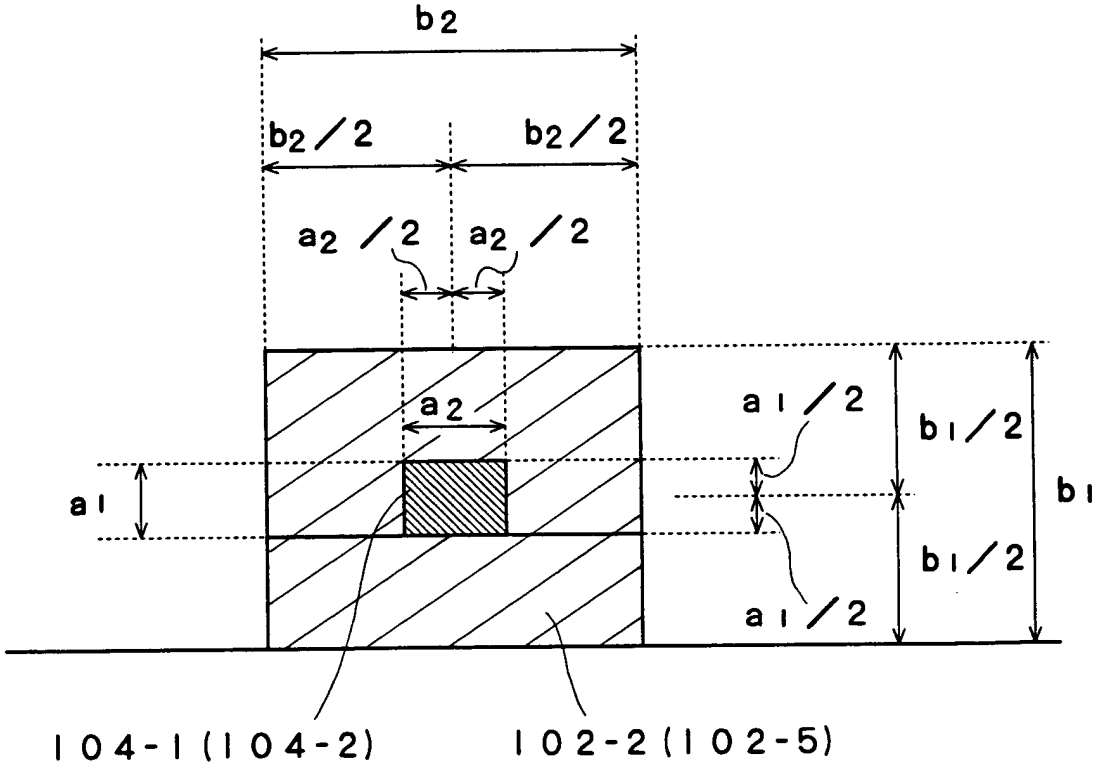

b2
b2/2
b2/2
a2/2
a2/2
a2
a1
a1/2
b1/2
b1/2
b1
a1/2
104-1 (104-2)
102-2 (102-5)

FIG. 12

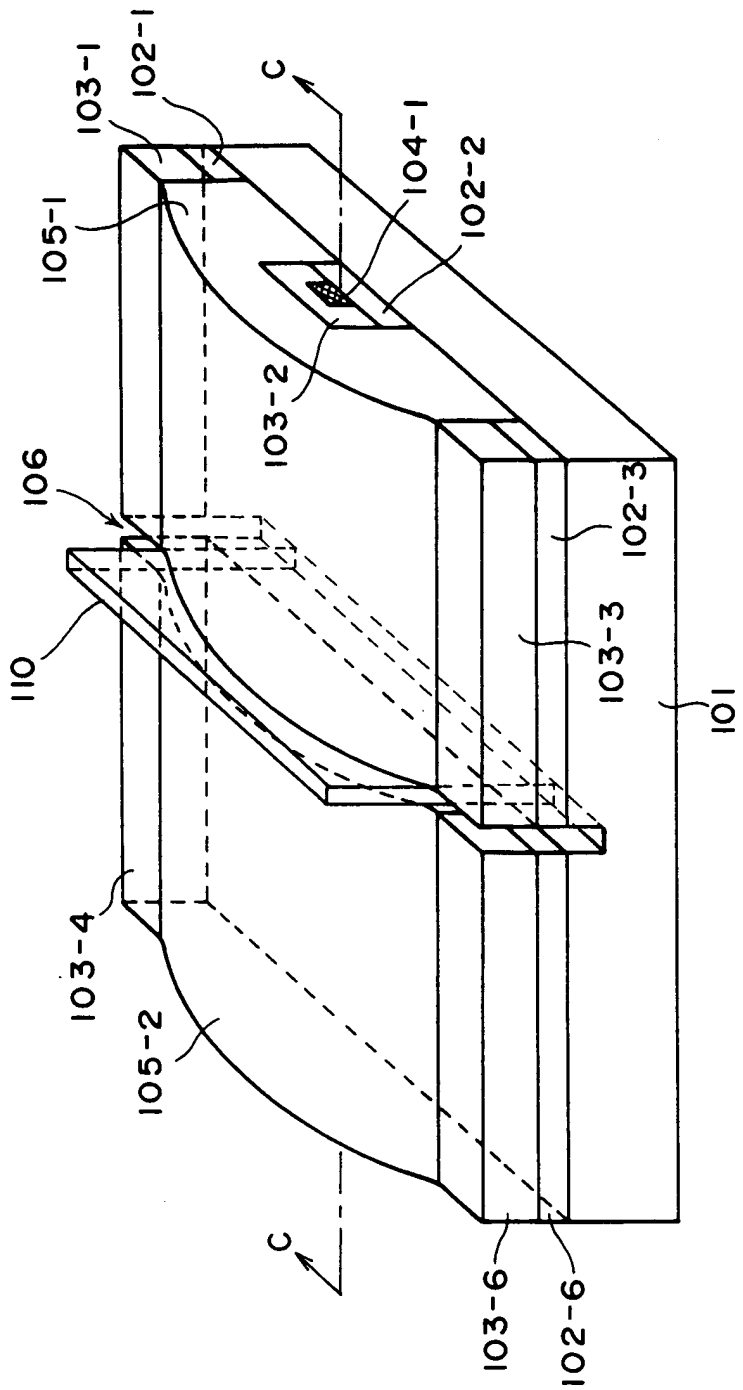

100
103-1
102-1
C
104-1
102-2
105-1
103-2
106
102-3
103-3
110
101
103-4
105-2
C
103-6
102-6

FIG. 13

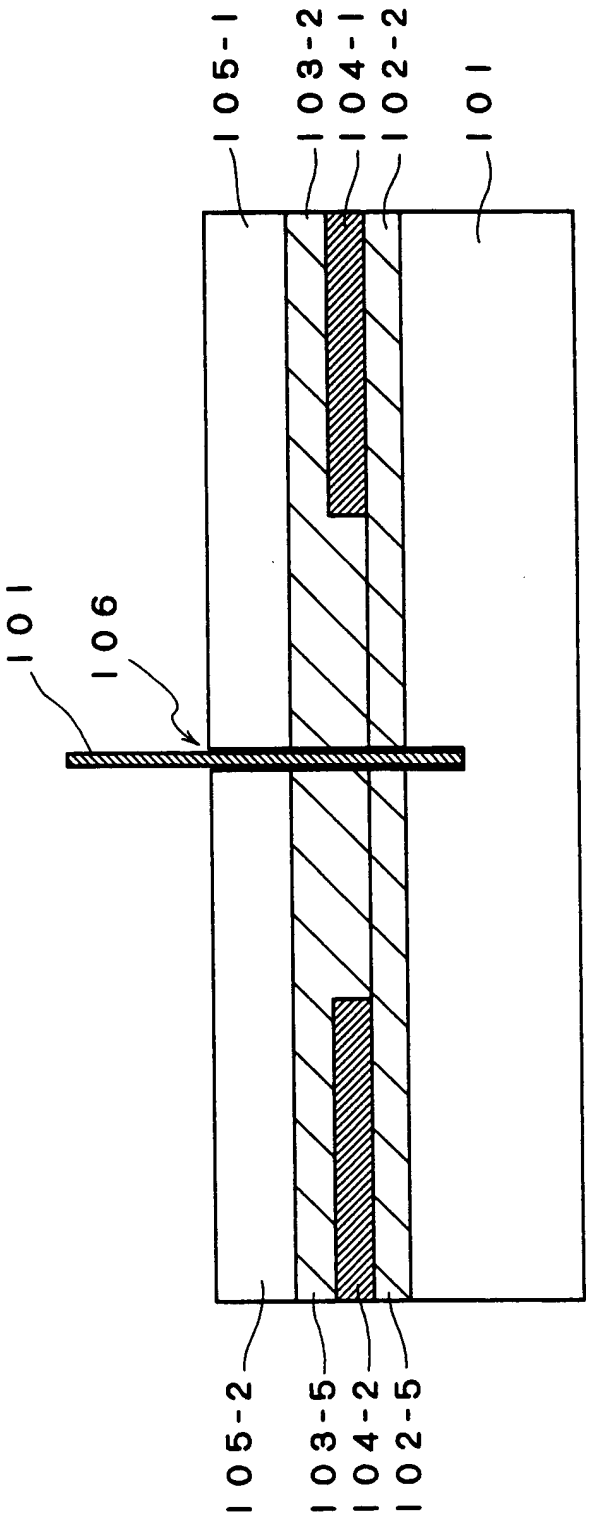


FIG. 14

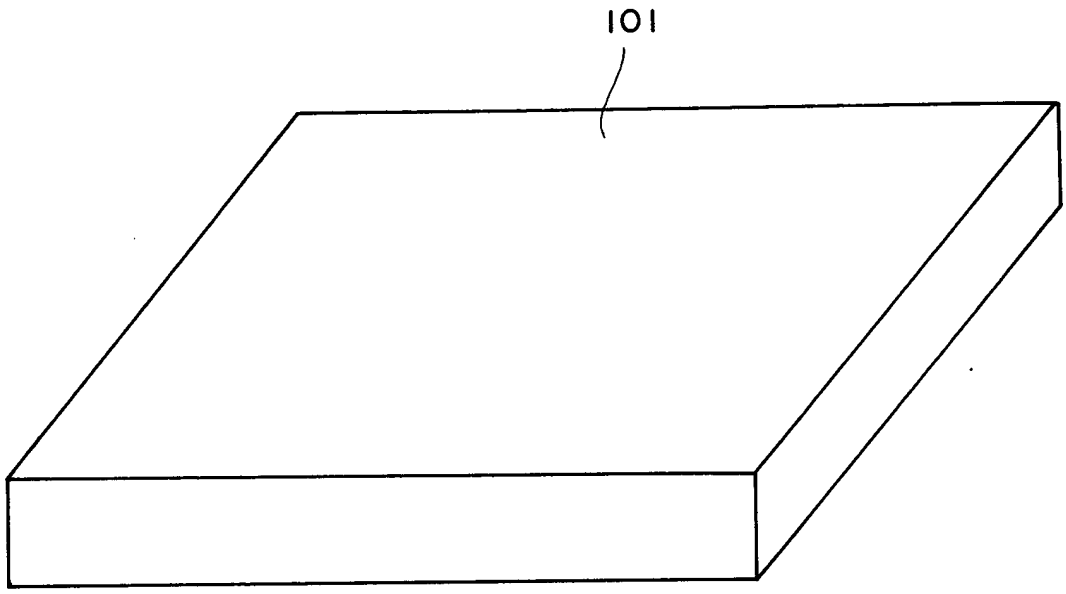


FIG. 15

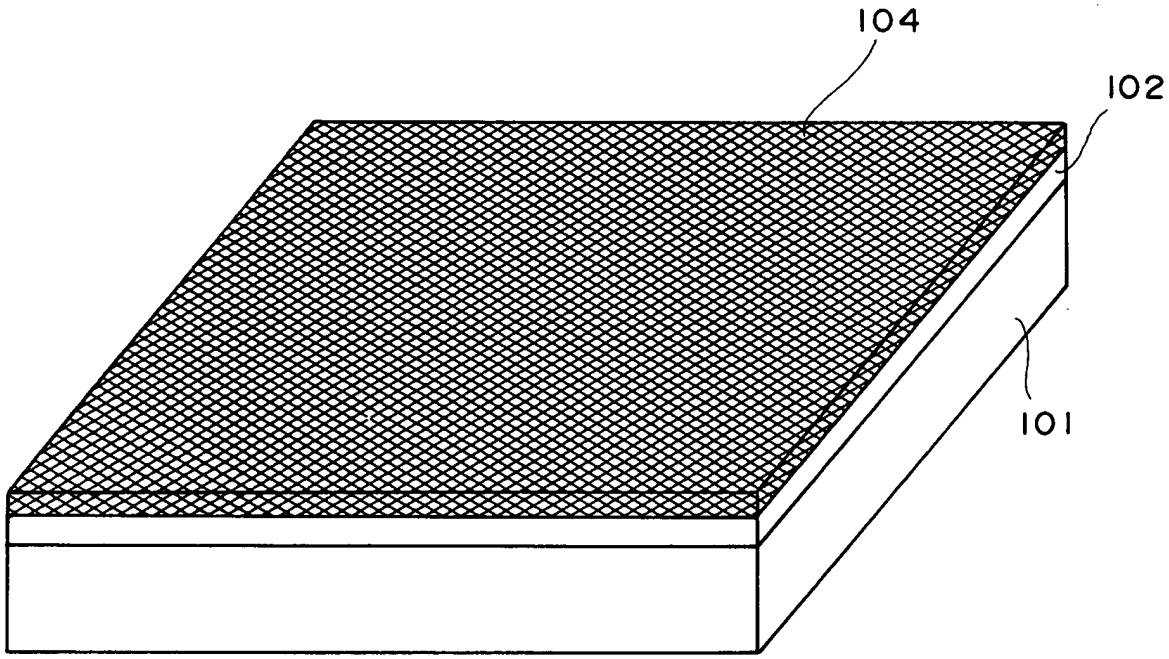


FIG. 16

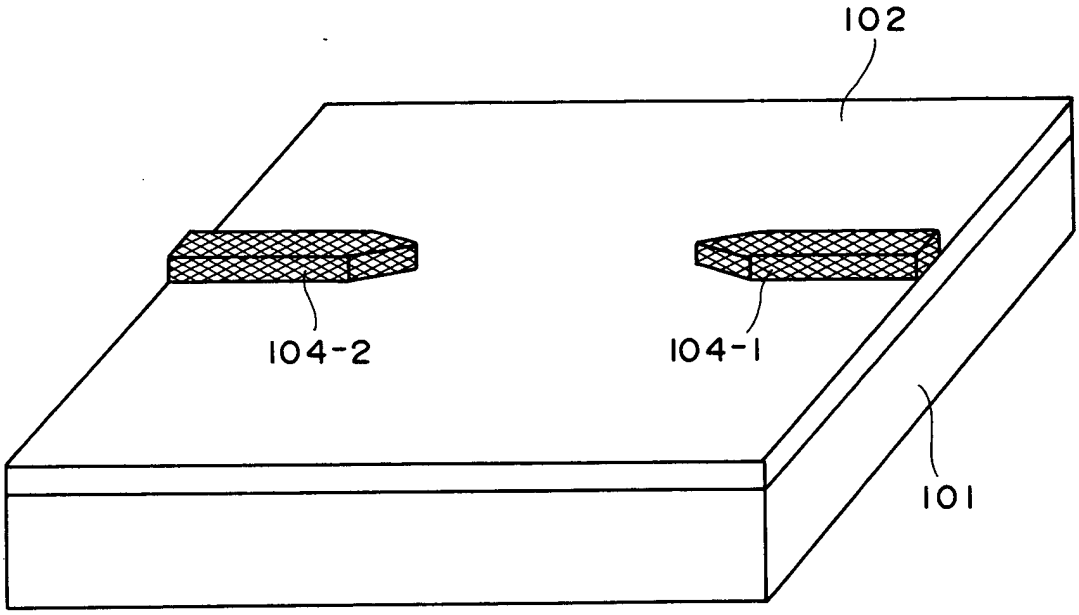
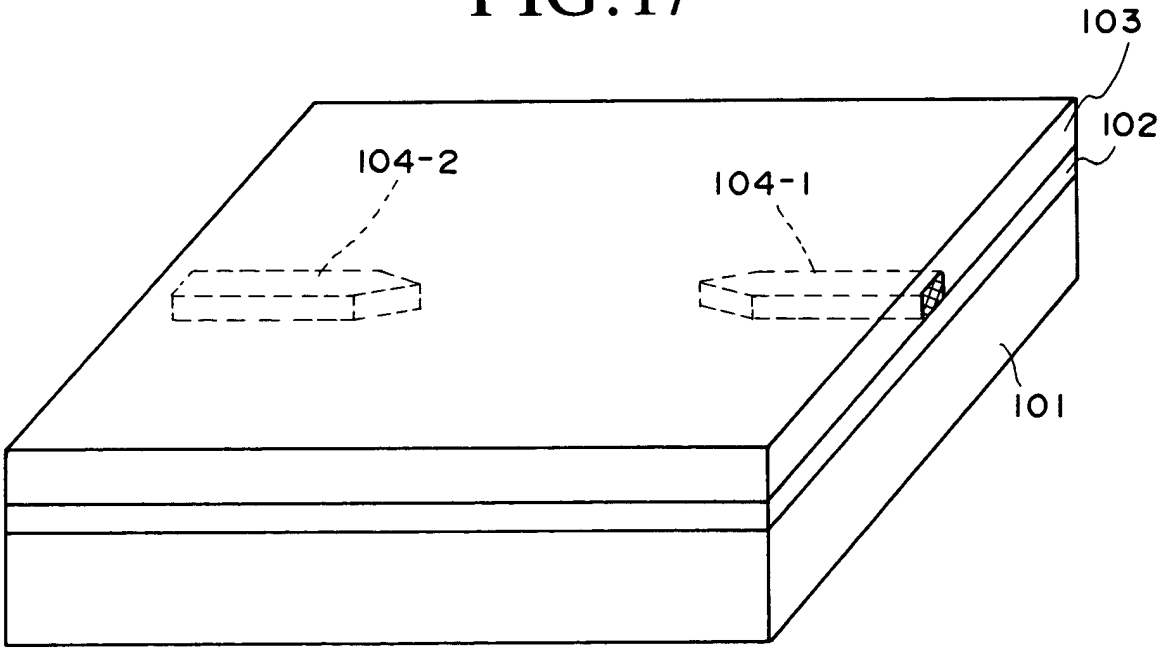


FIG. 17



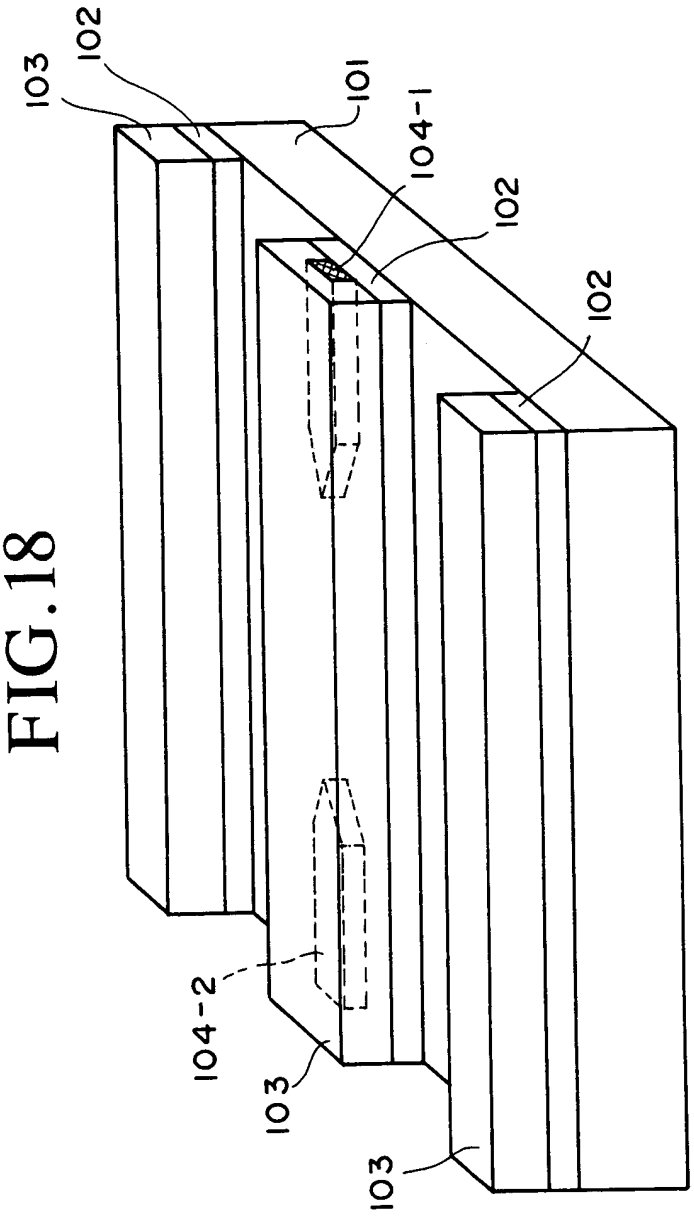


FIG. 18

FIG. 19

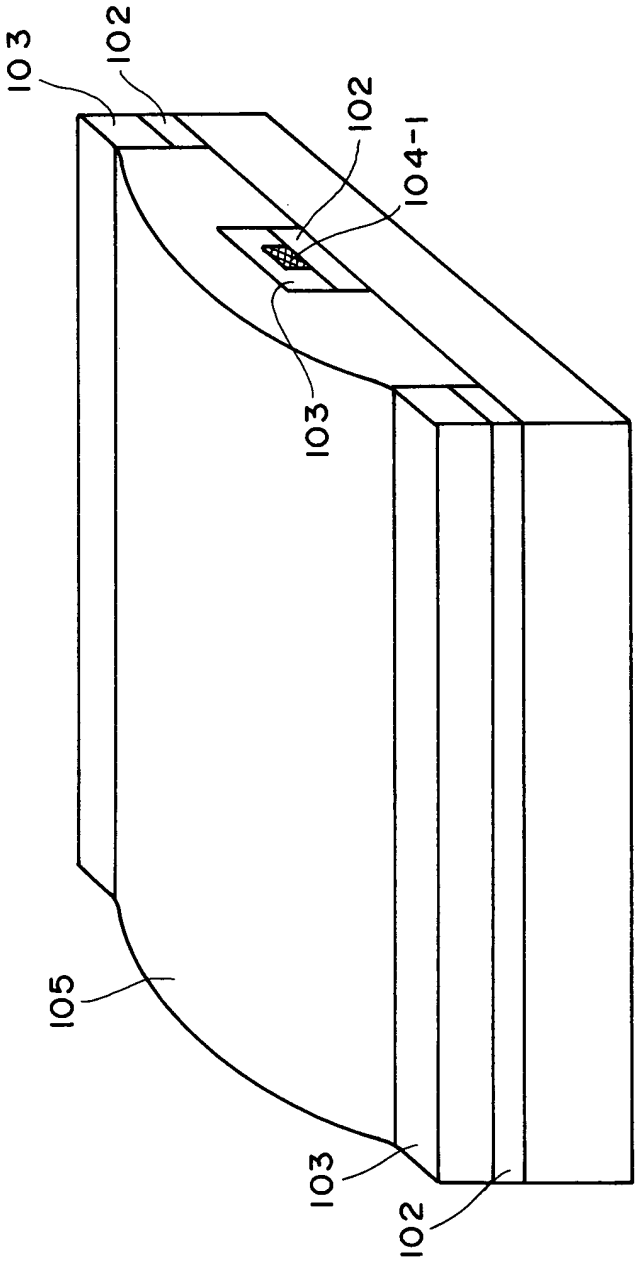


FIG.20

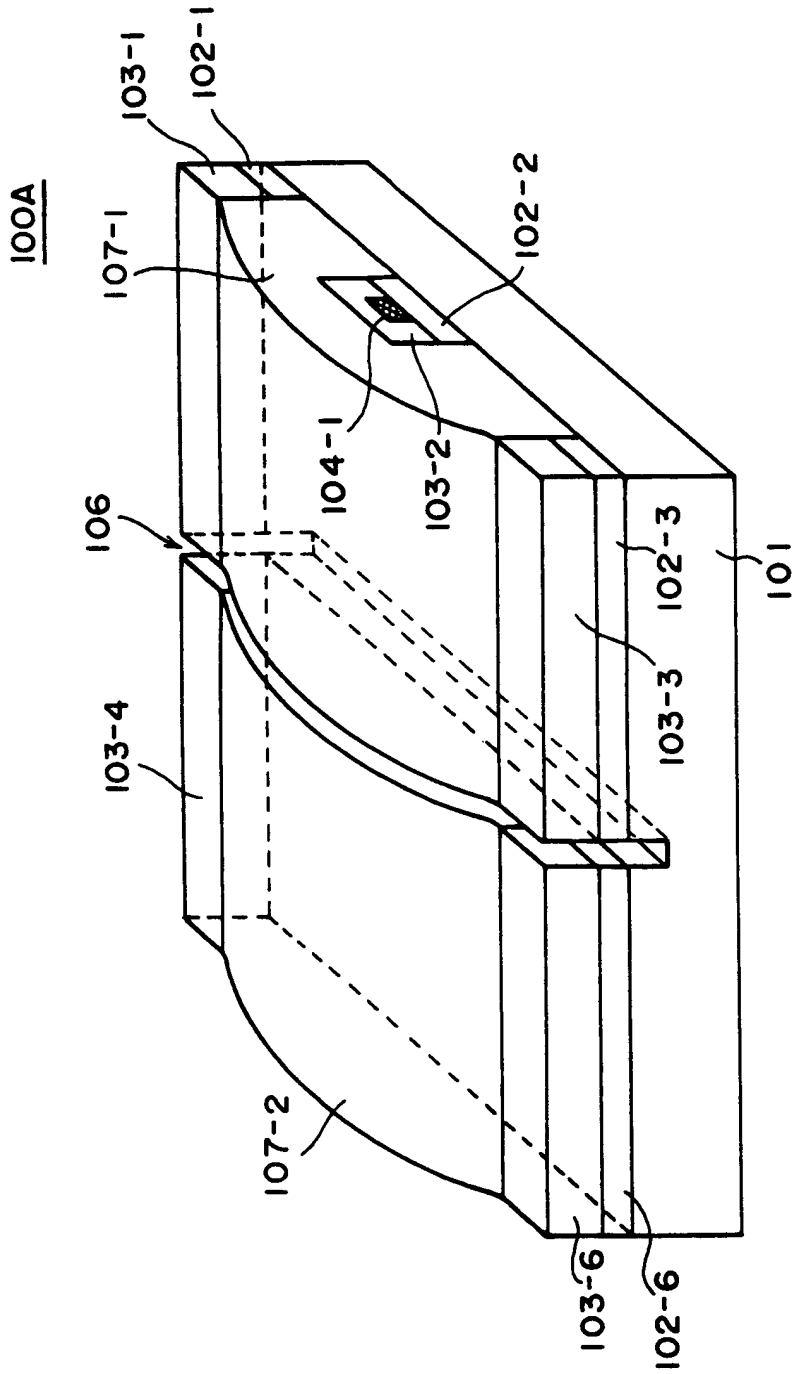

100A
103-1
102-1
107-1
102-2
104-1
103-2
106
102-3
101
103-3
103-4
107-2
103-6
102-6

FIG.21

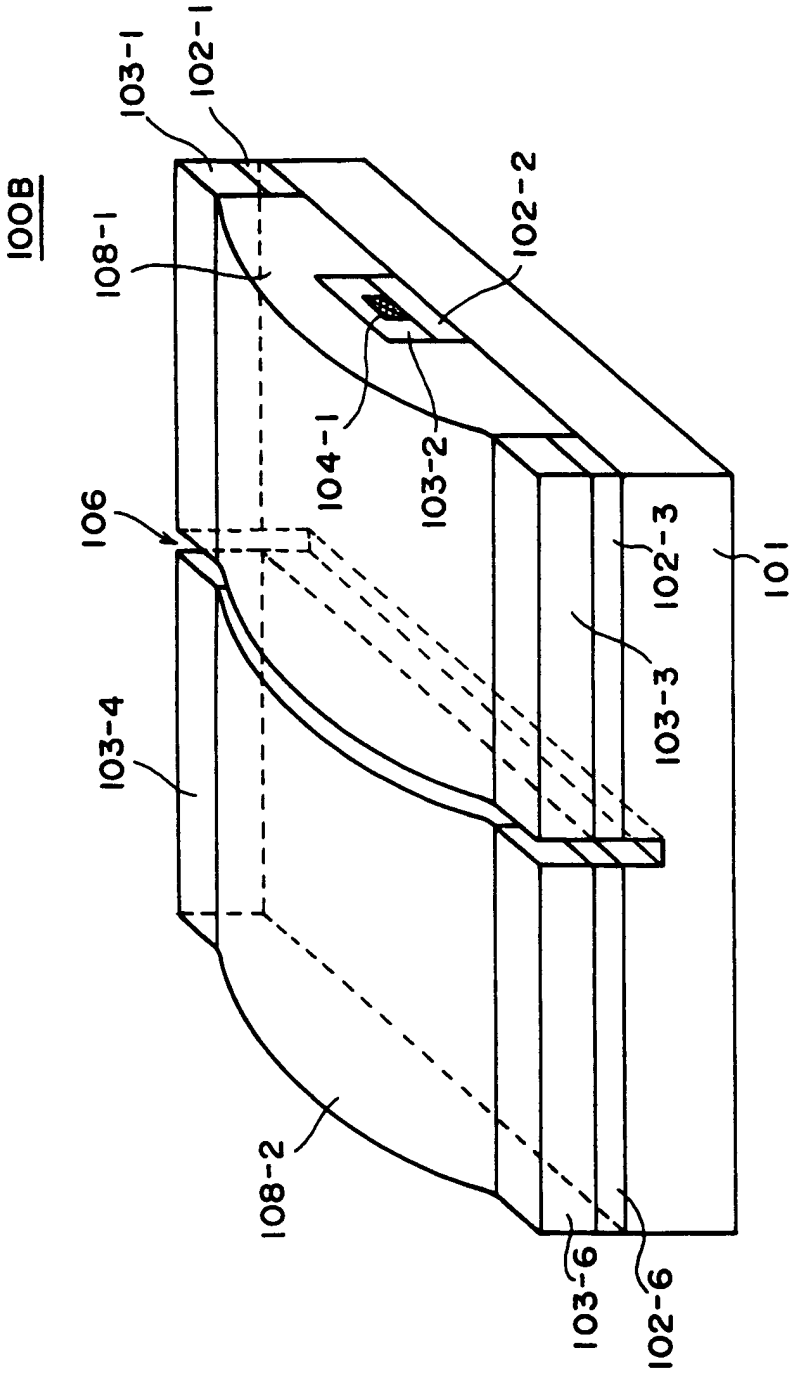

100B
103-1
102-1
102-2
108-1
104-1
103-2
106
102-3
101
103-3
103-4
108-2
103-6
102-6

FIG.22

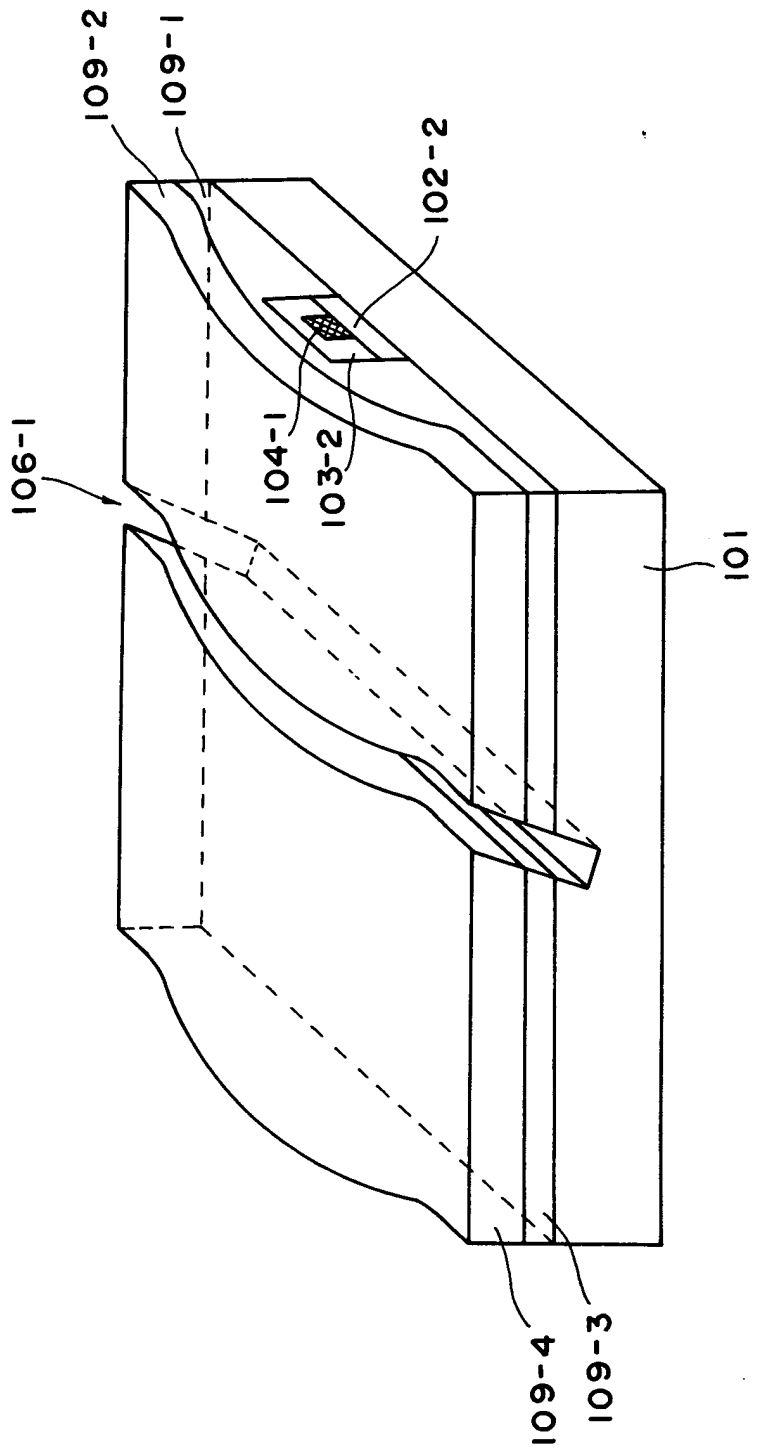


FIG.23

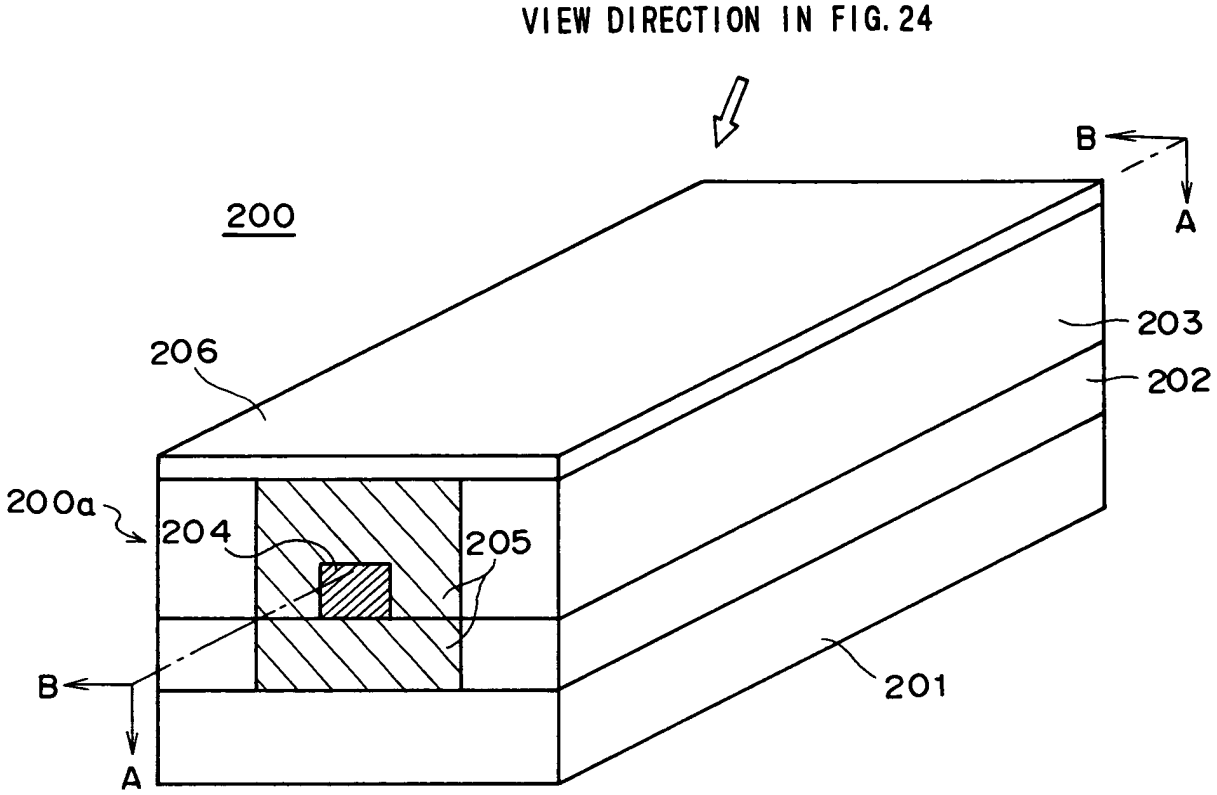

VIEW DIRECTION IN FIG. 24
B
A
200
203
206
202
200a
204
205
B
A
201

FIG.24

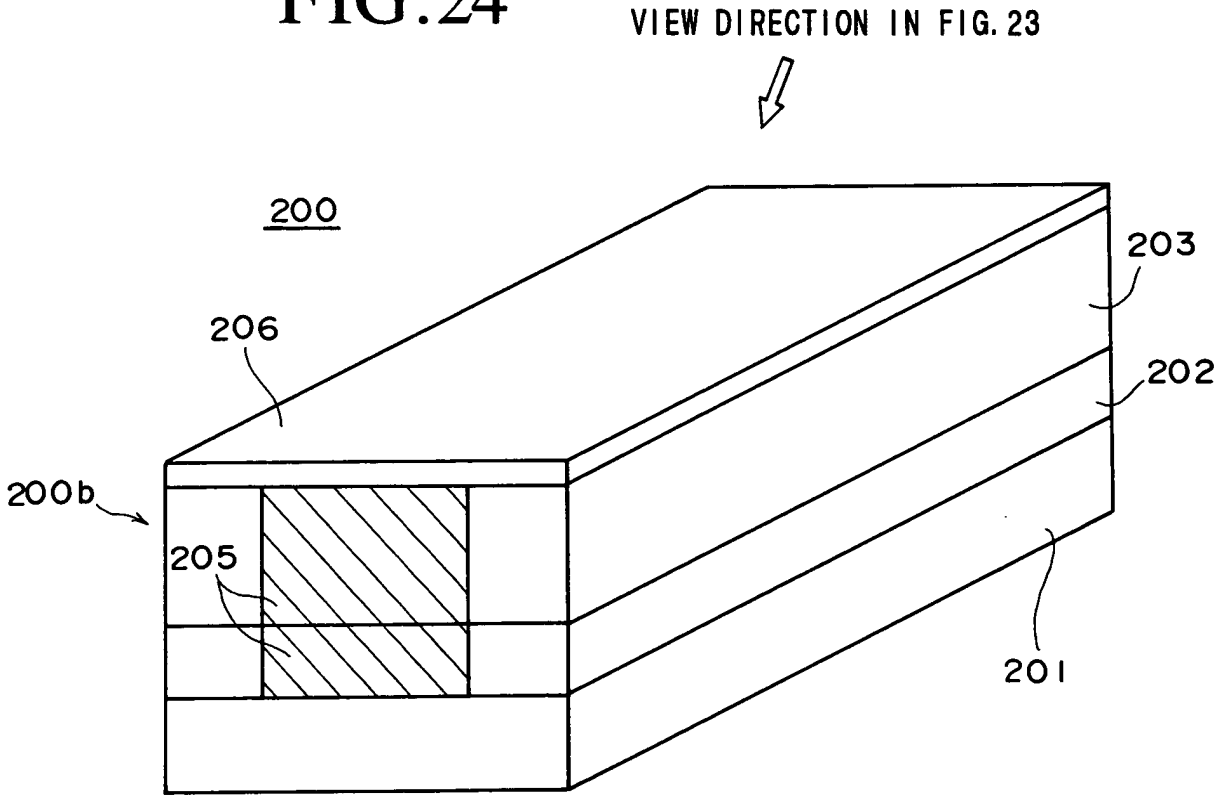

VIEW DIRECTION IN FIG. 23
200
203
206
202
200b
205
201

FIG.25

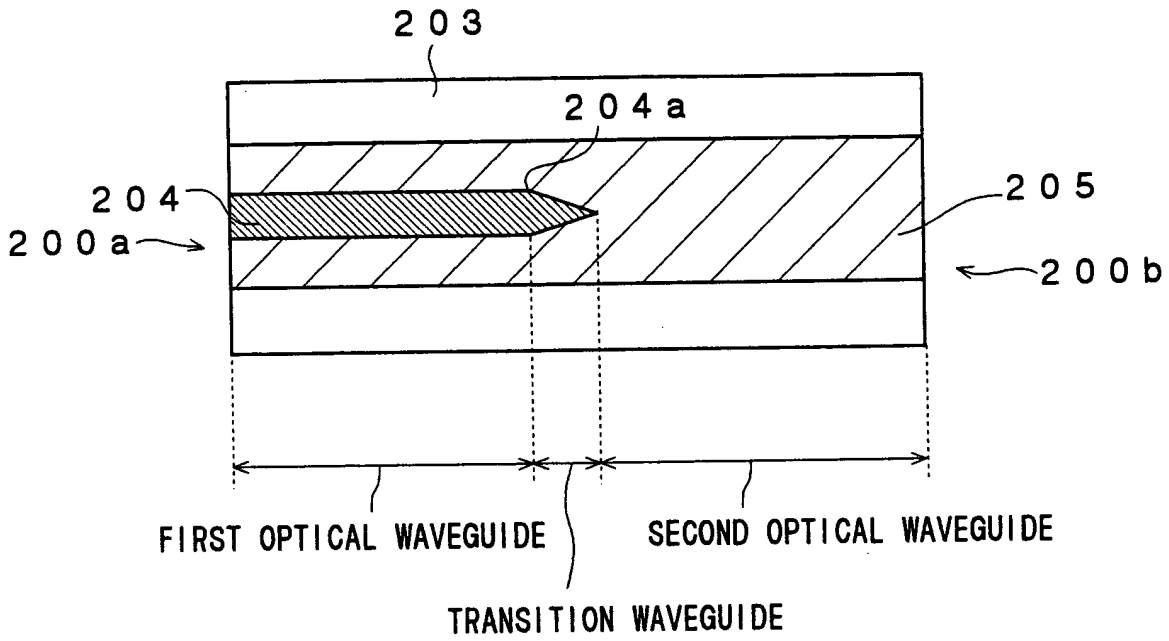

203
204a
204
200a
205
200b
FIRST OPTICAL WAVEGUIDE
SECOND OPTICAL WAVEGUIDE
TRANSITION WAVEGUIDE

FIG.26

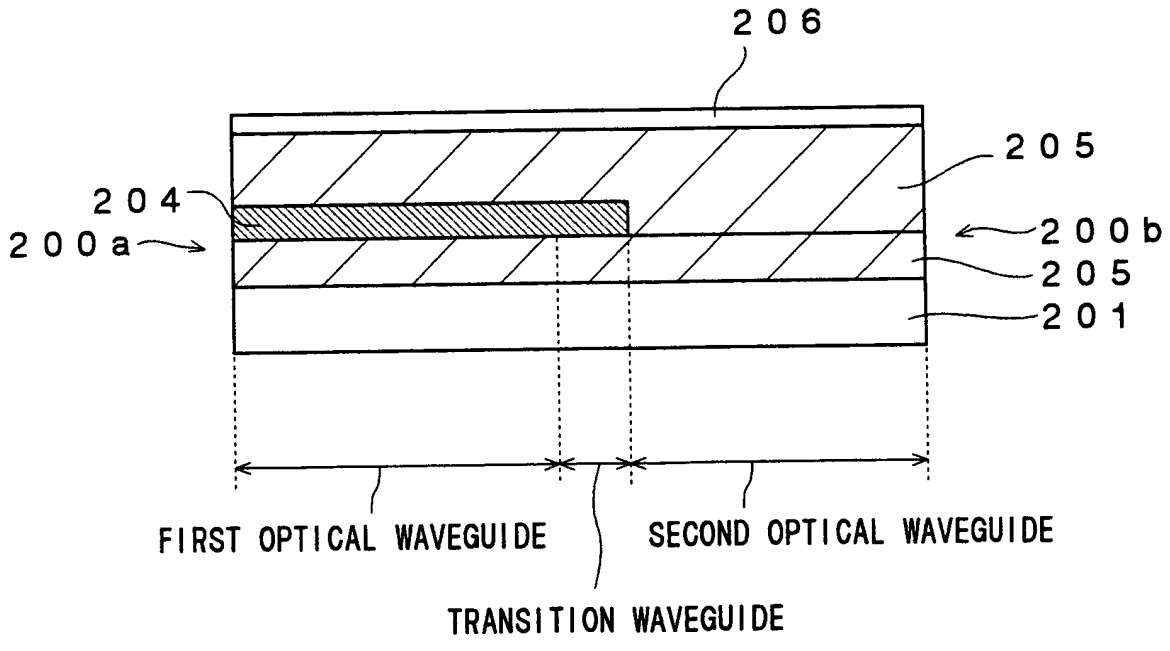

206
205
204
200a
200b
205
201
FIRST OPTICAL WAVEGUIDE
SECOND OPTICAL WAVEGUIDE
TRANSITION WAVEGUIDE

FIG.27

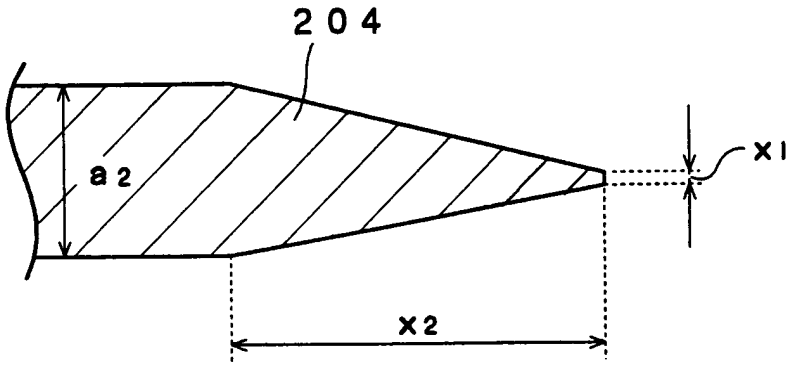

204
a2
x1
x2

FIG.28

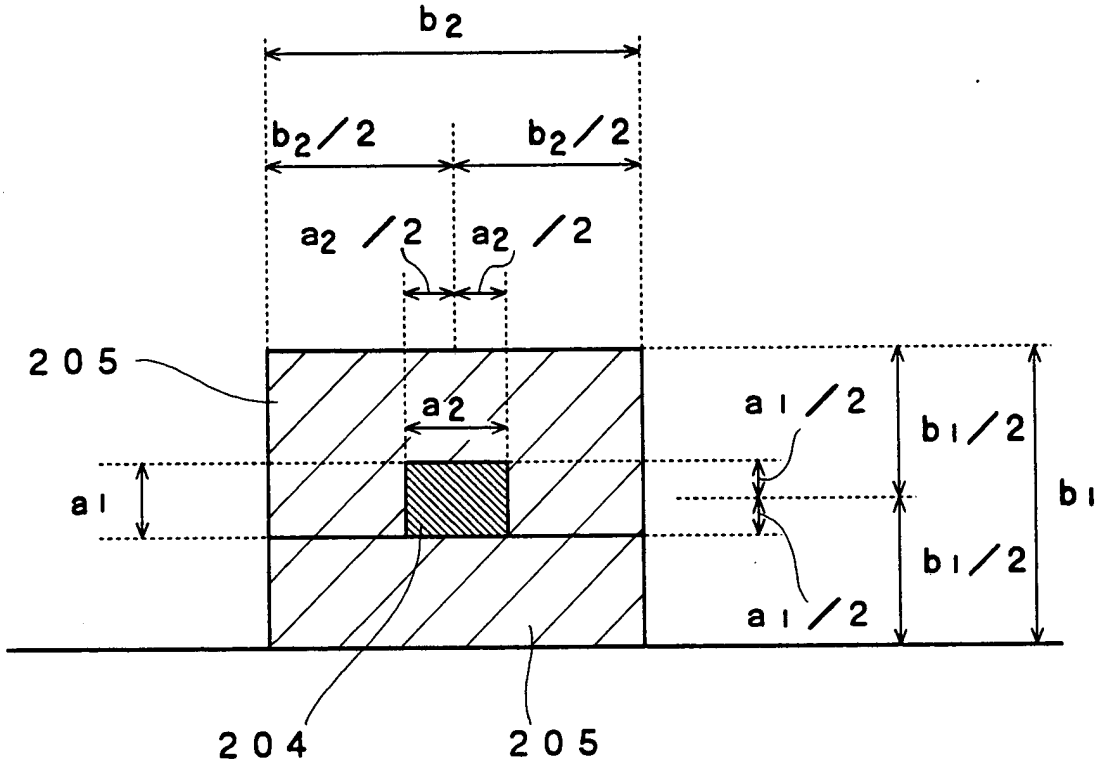

b2
b2/2
b2/2
a2/2
a2/2
205
a2
a1
a1/2
b1/2
b1
b1/2
a1/2
204
205

FIG.29

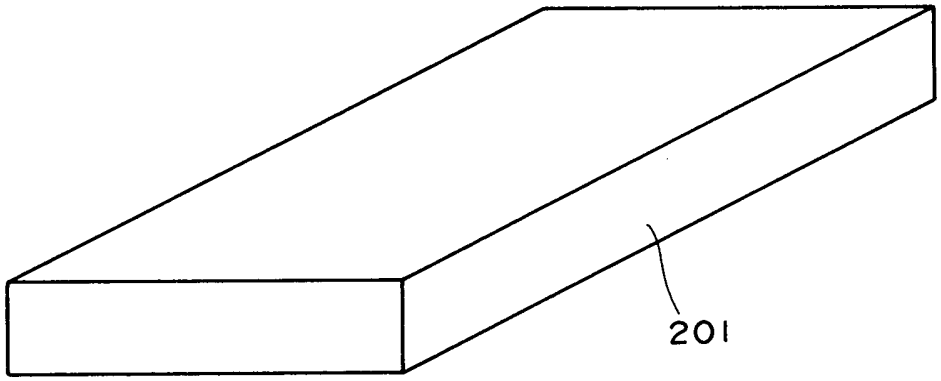


FIG.30

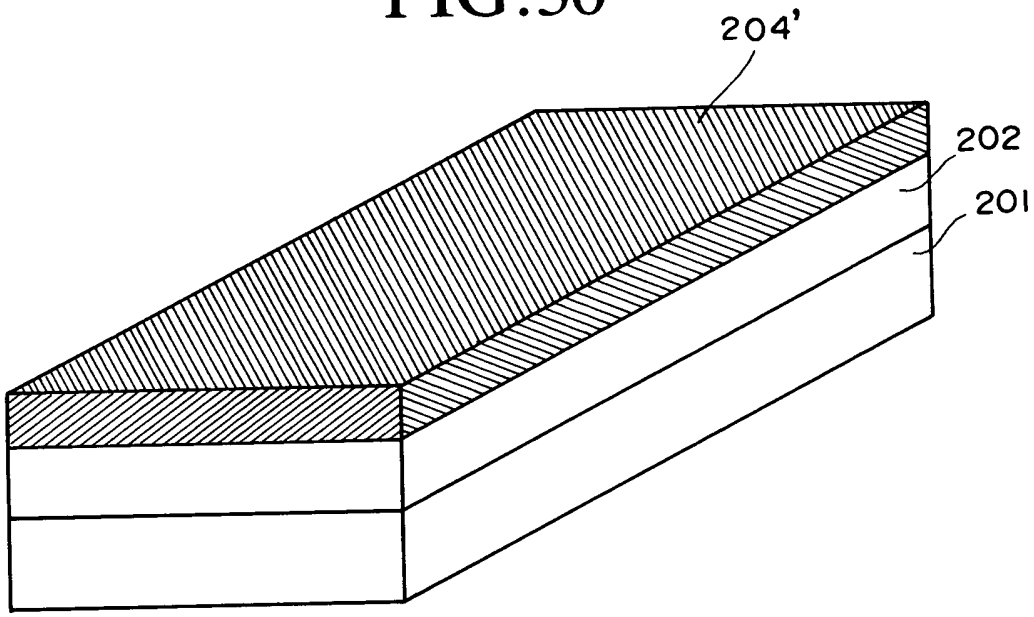


FIG.31

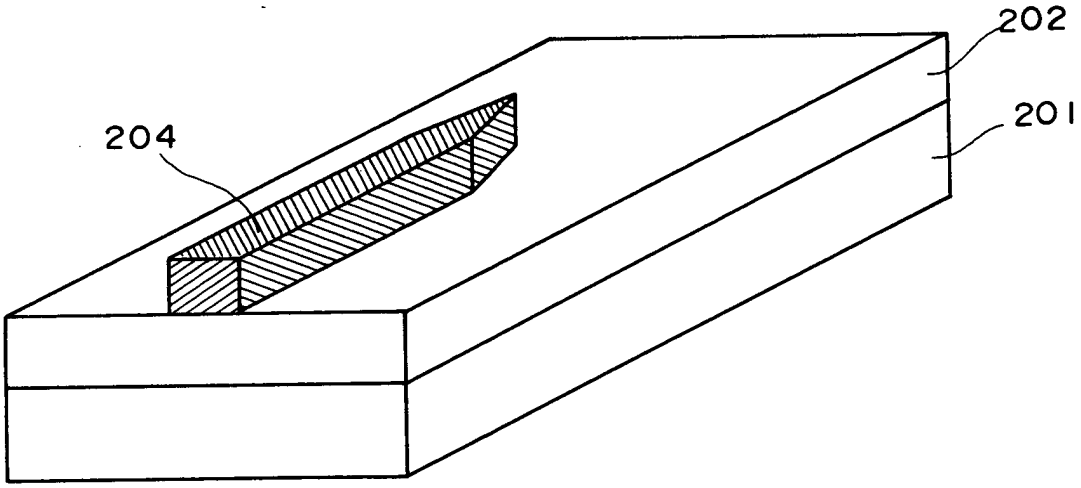


FIG.32

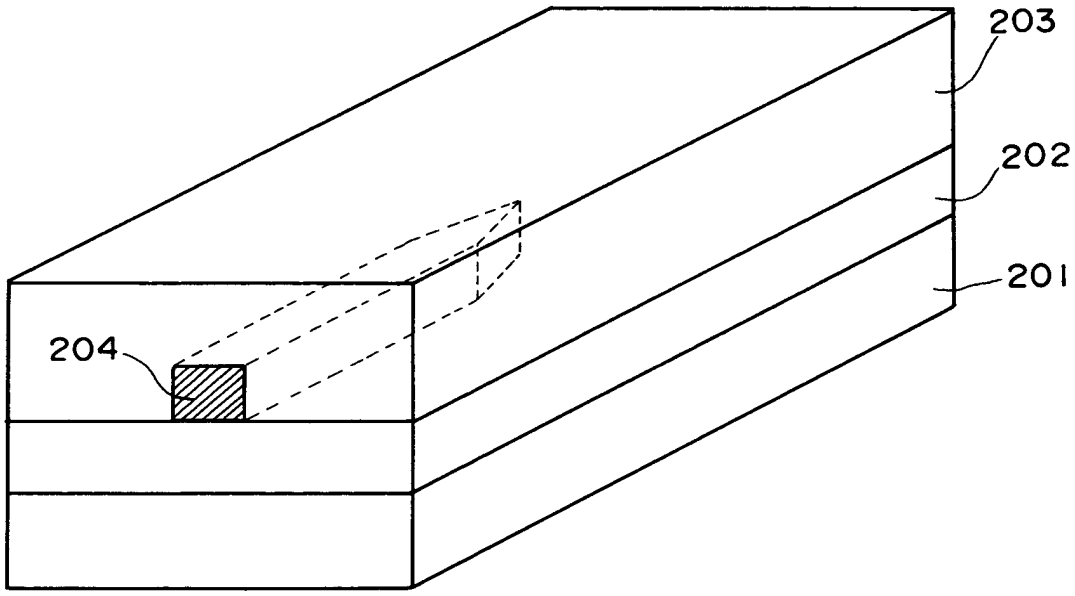


FIG.33

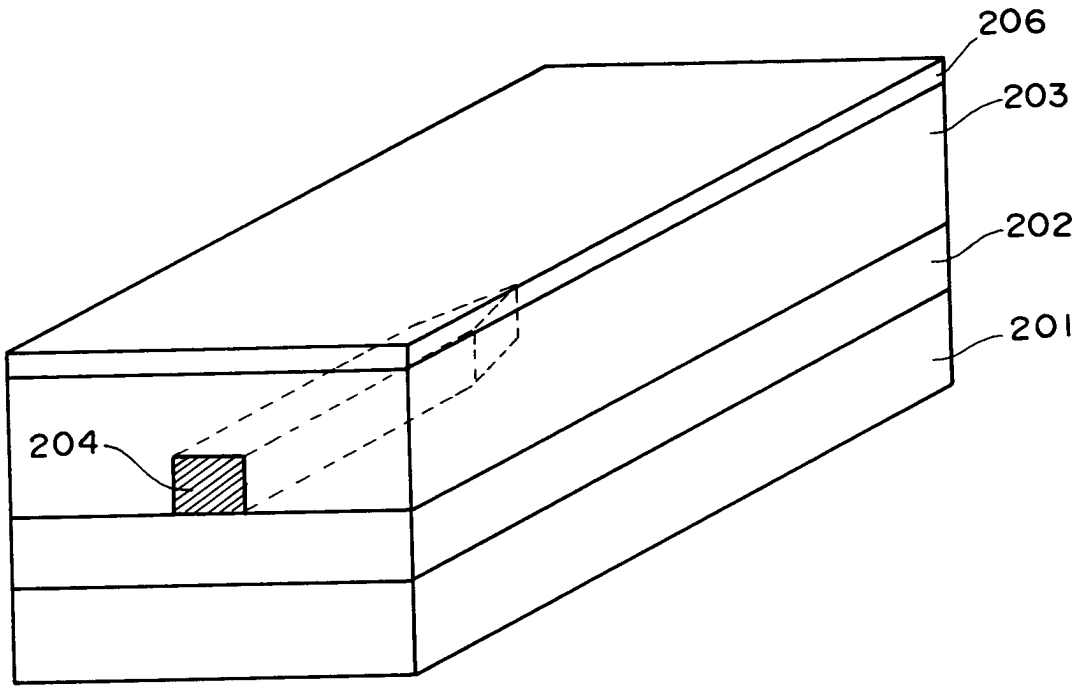


FIG.34

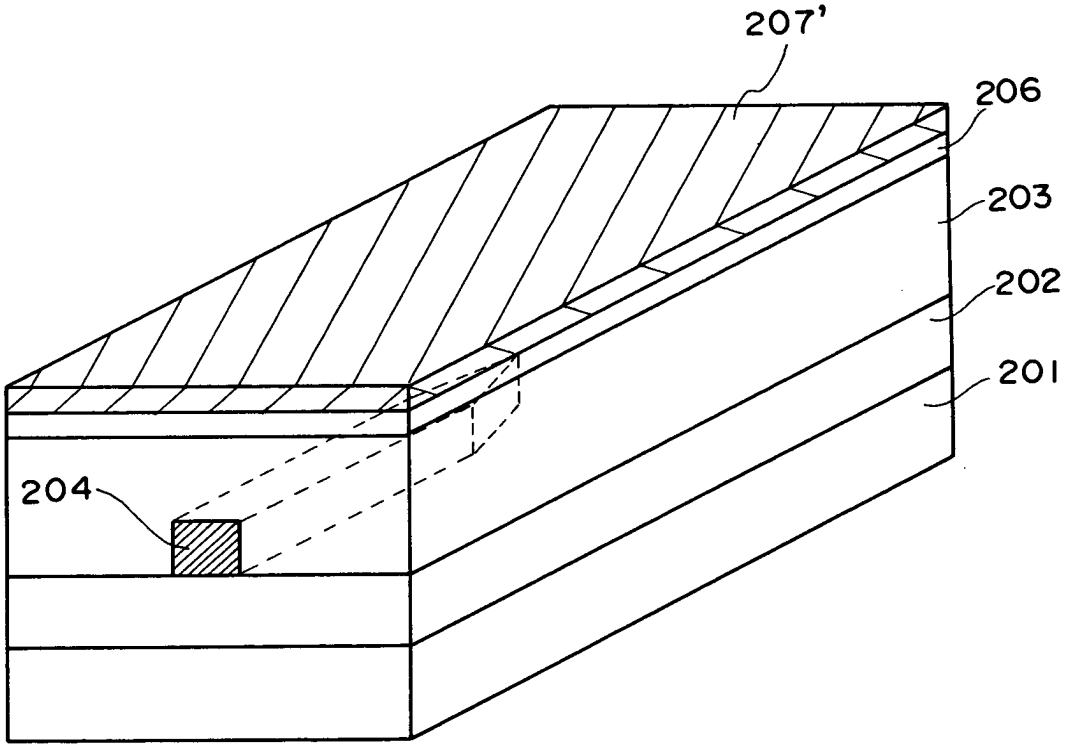


FIG.35

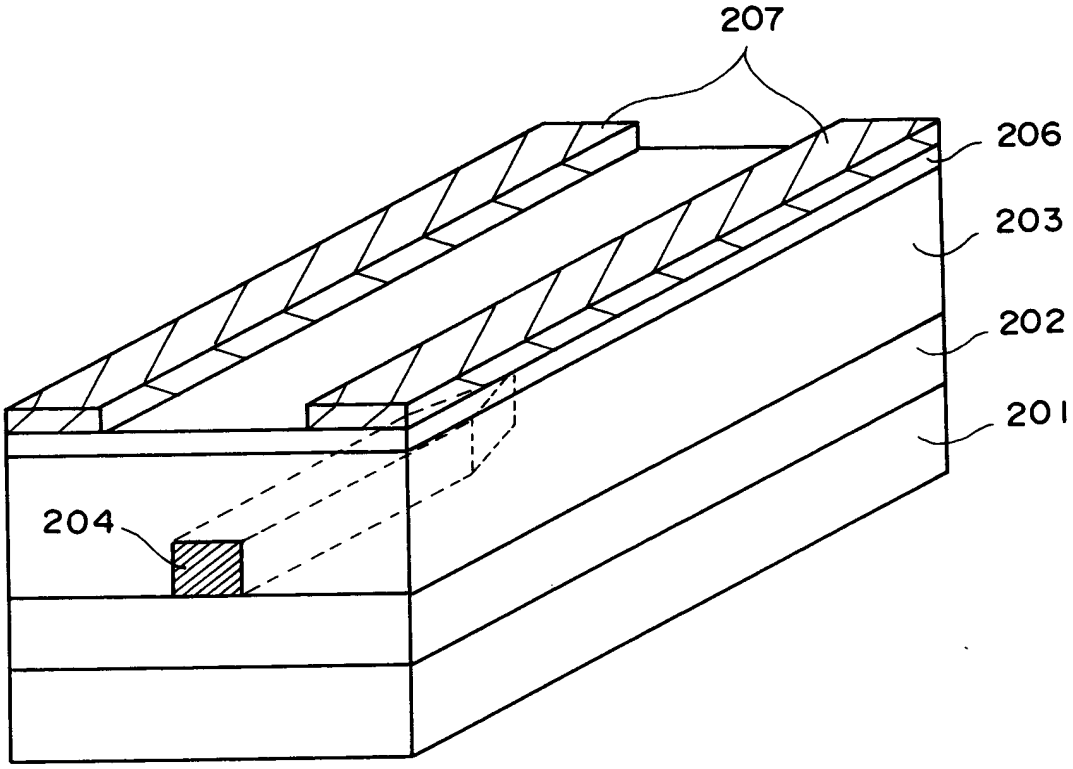


FIG.36

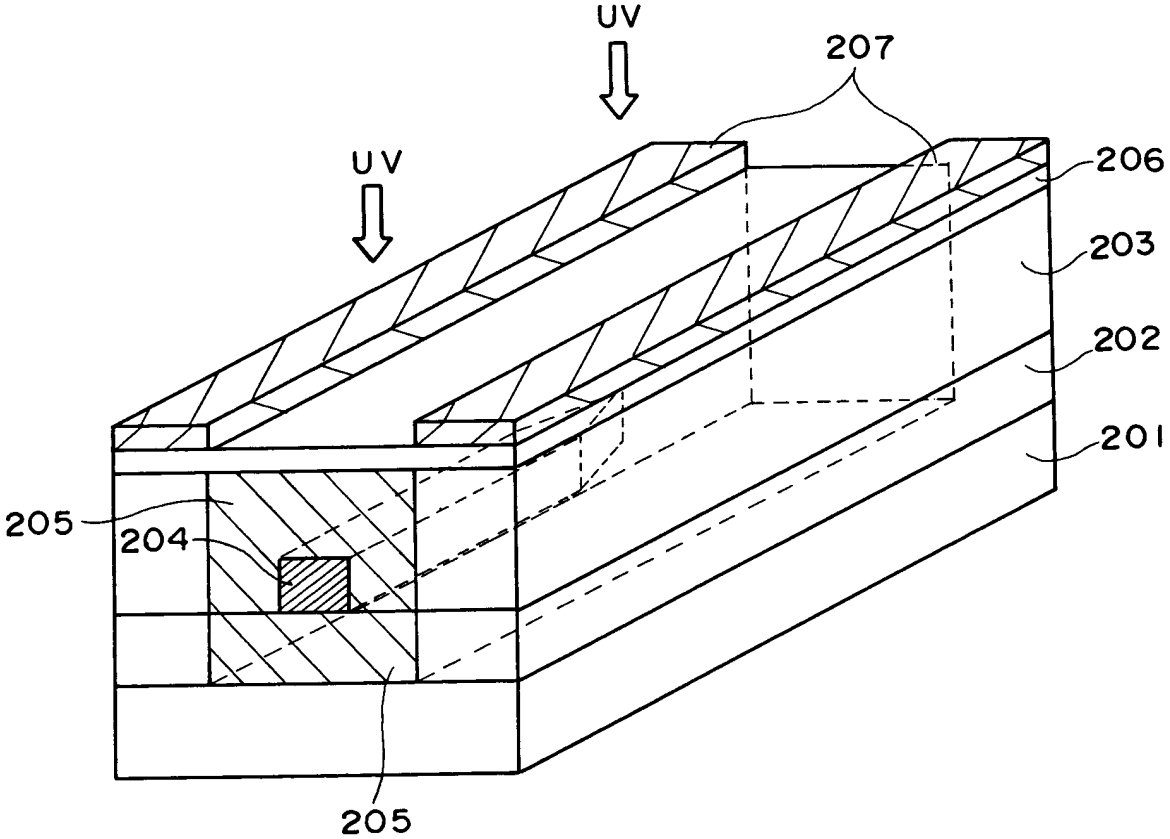


FIG.37

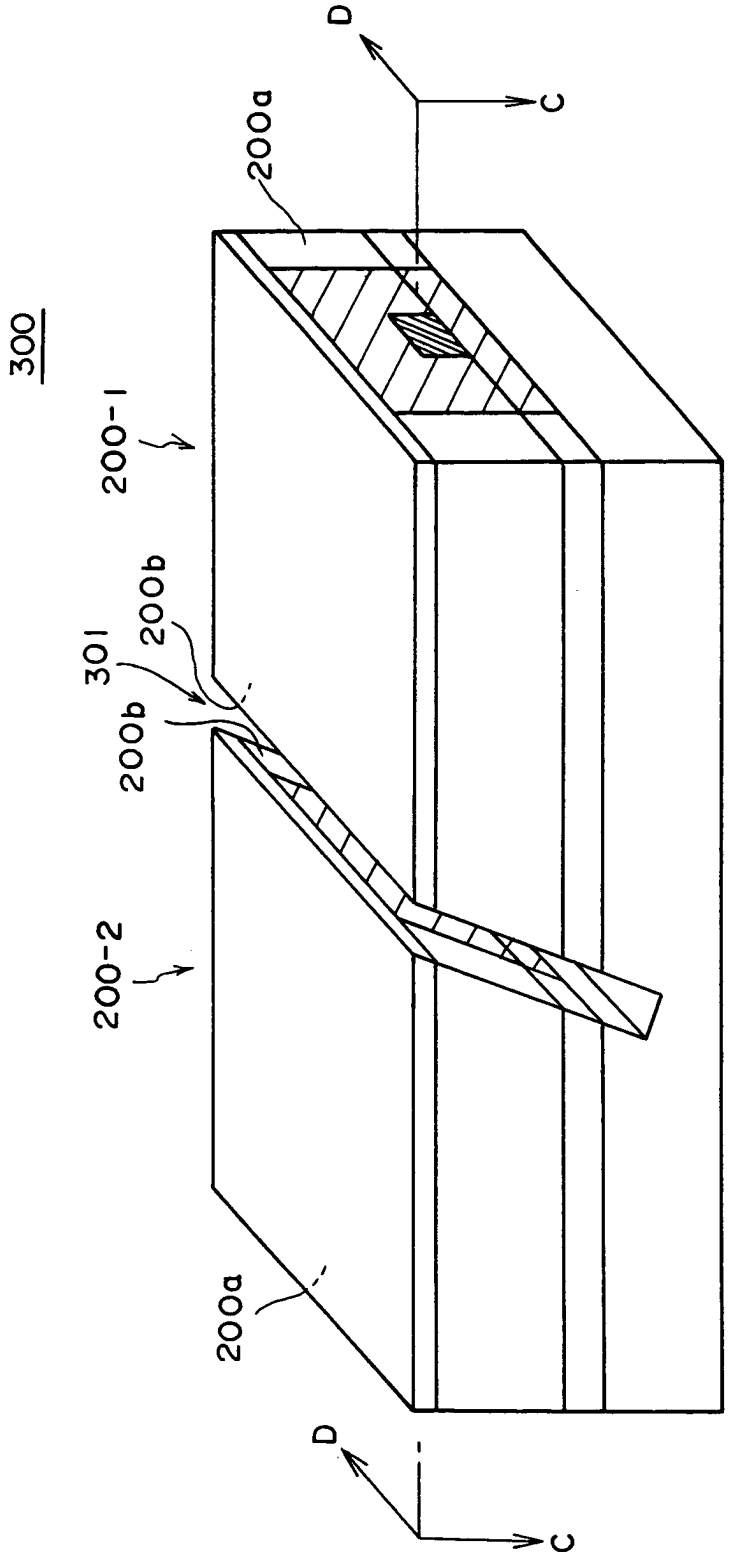


FIG.38

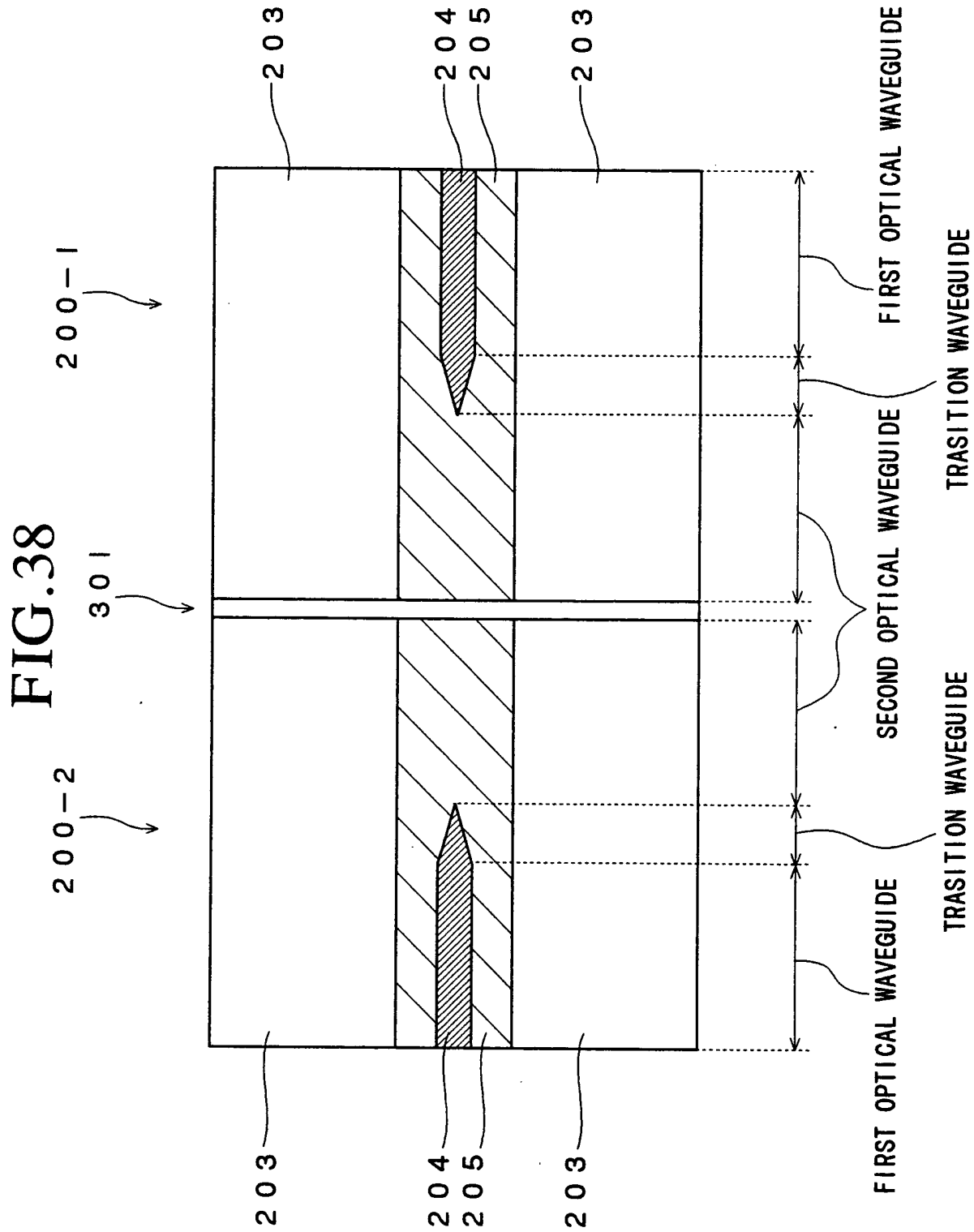

200-1
301
200-2
203
204
205
203
203
204
205
203
FIRST OPTICAL WAVEGUIDE
TRASITION WAVEGUIDE
SECOND OPTICAL WAVEGUIDE
TRASITION WAVEGUIDE
FIRST OPTICAL WAVEGUIDE

FIG.39

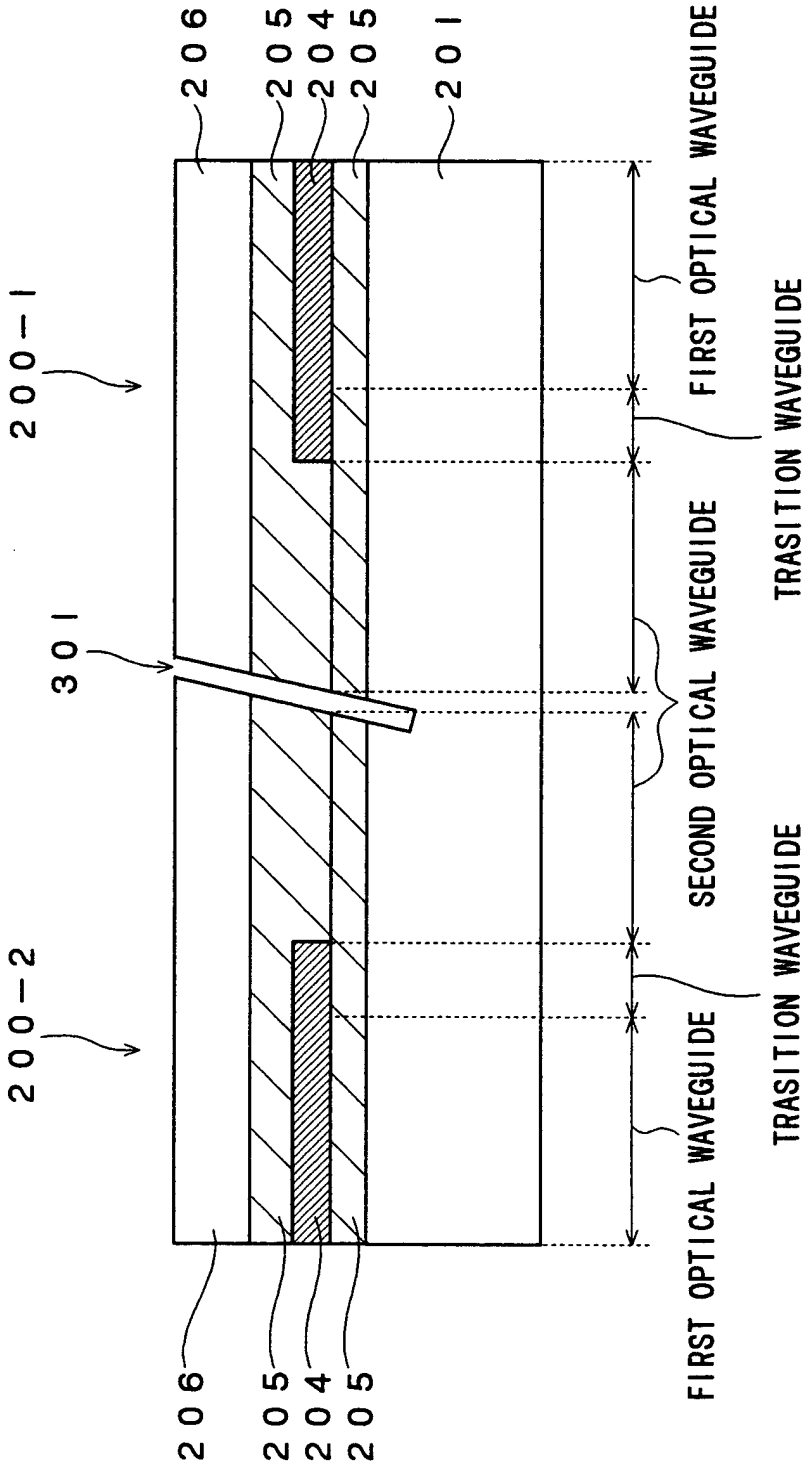

206
205
204
205
201
200-1
301
200-2
206
205
204
205
FIRST OPTICAL WAVEGUIDE
TRASITION WAVEGUIDE
SECOND OPTICAL WAVEGUIDE
TRASITION WAVEGUIDE
FIRST OPTICAL WAVEGUIDE

FIG.40

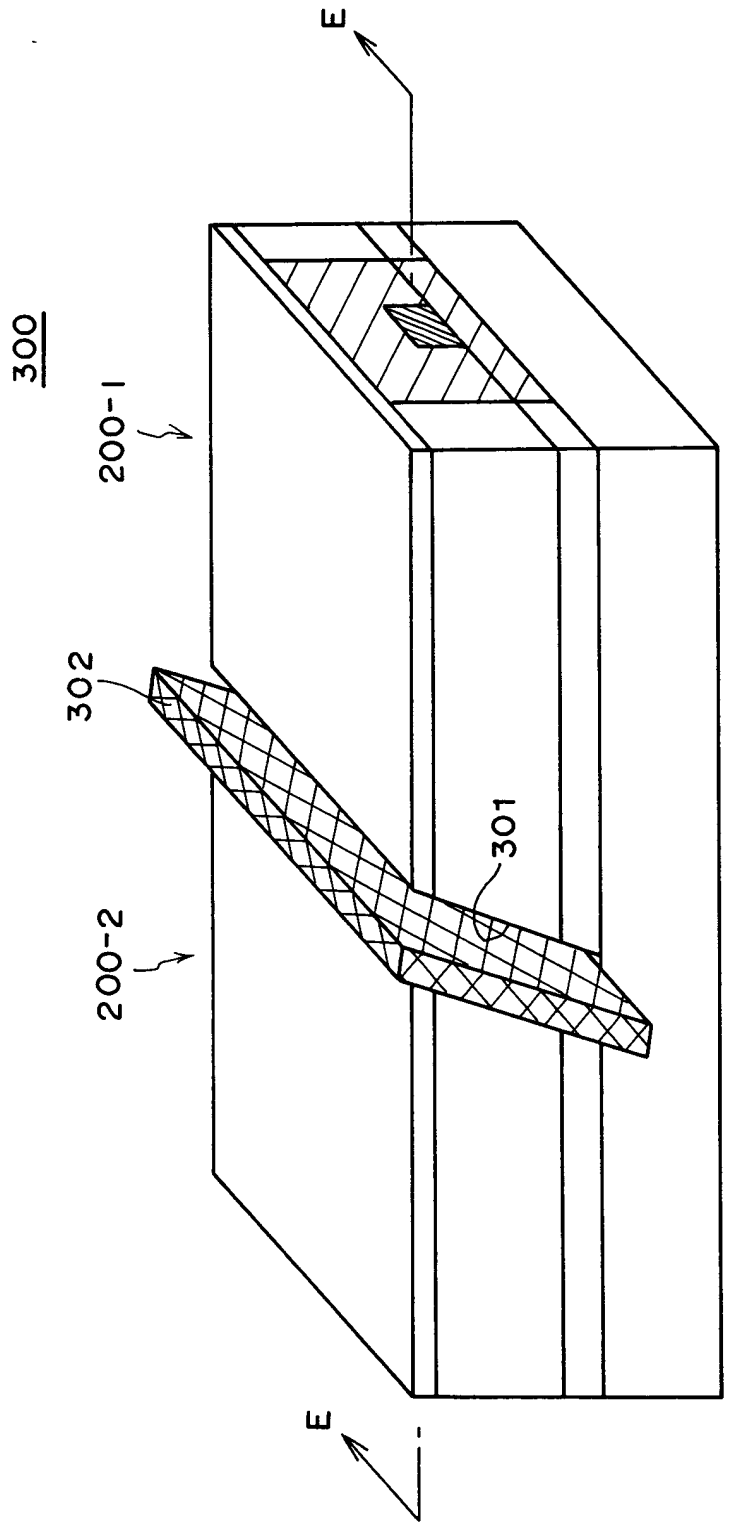


FIG.41

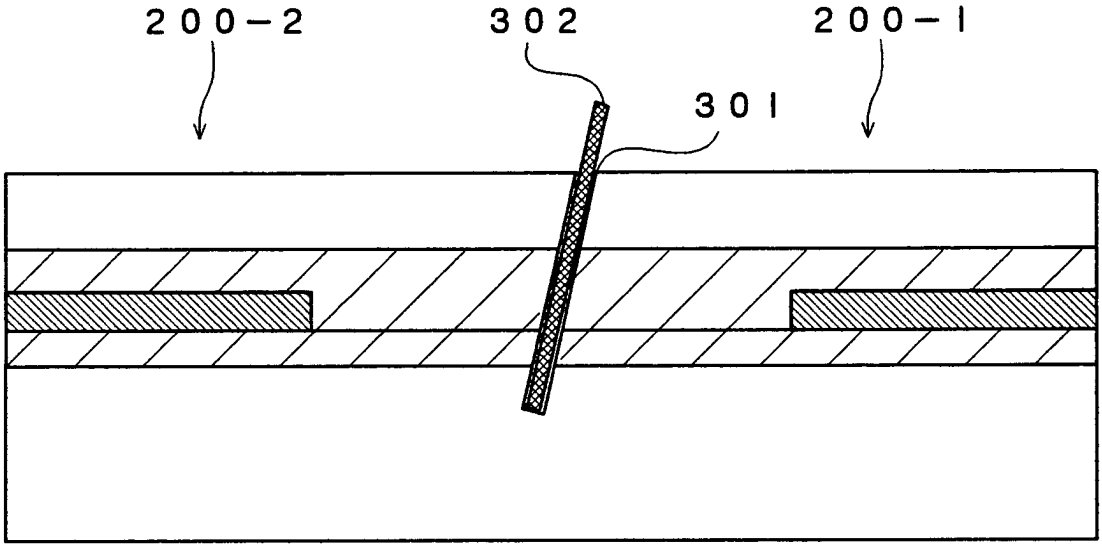


FIG.42

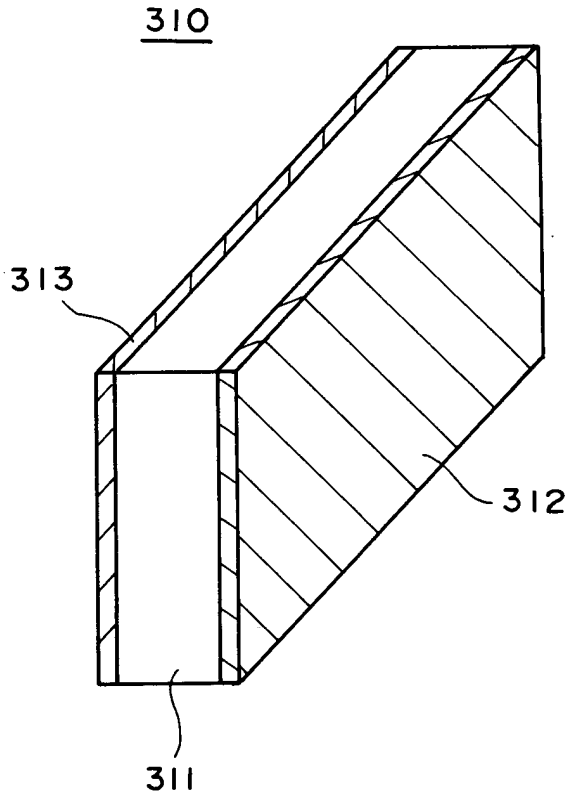


FIG.43

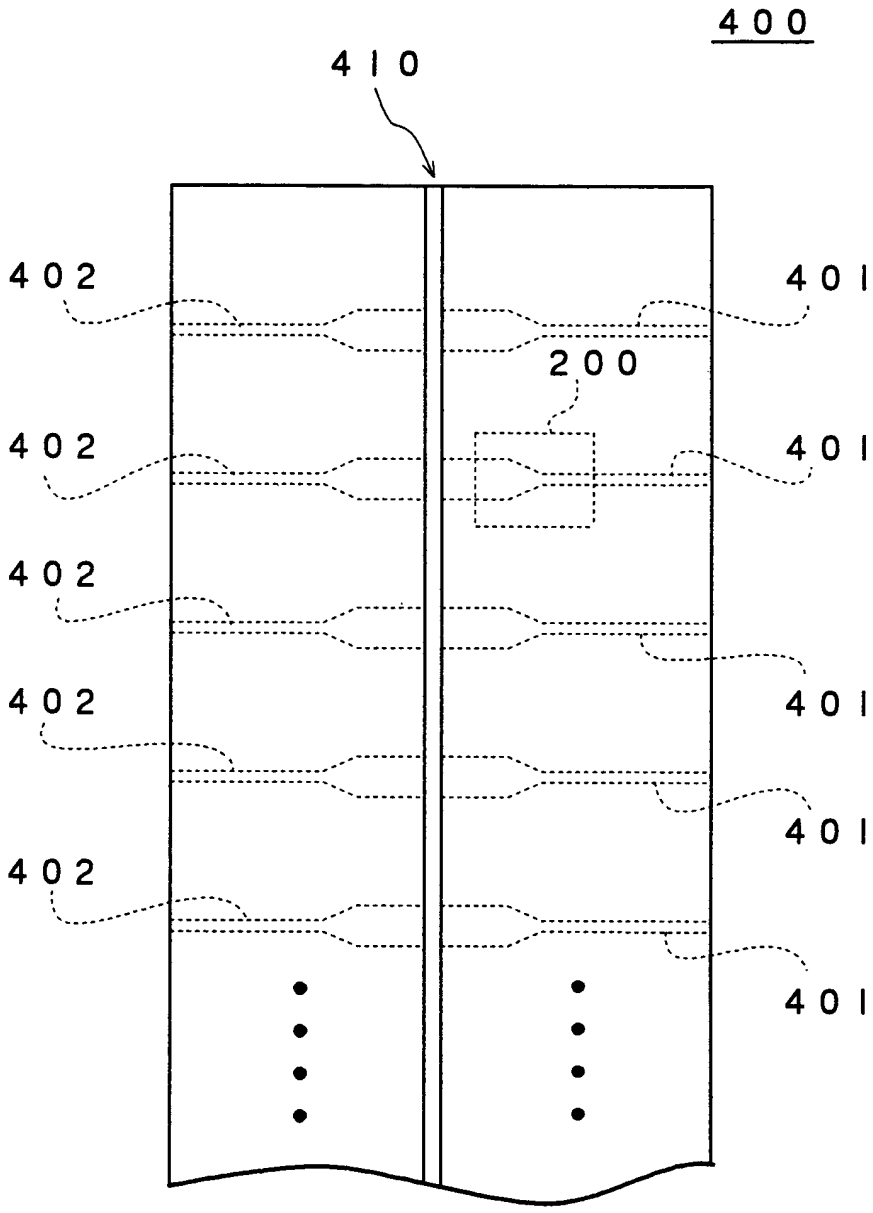


FIG.44

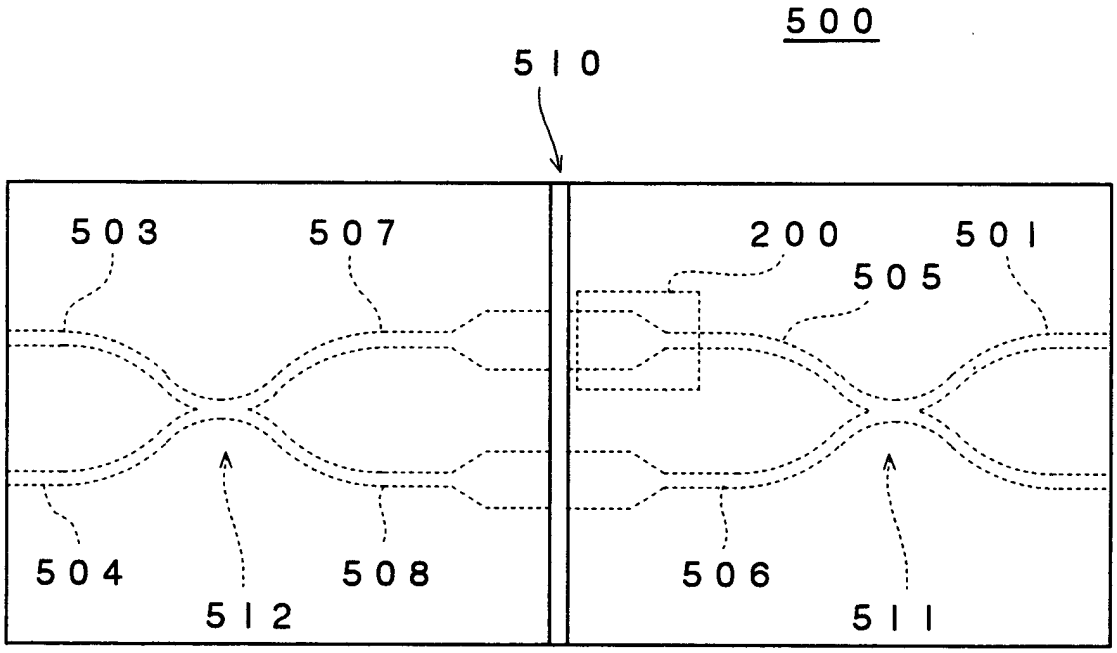


FIG.45

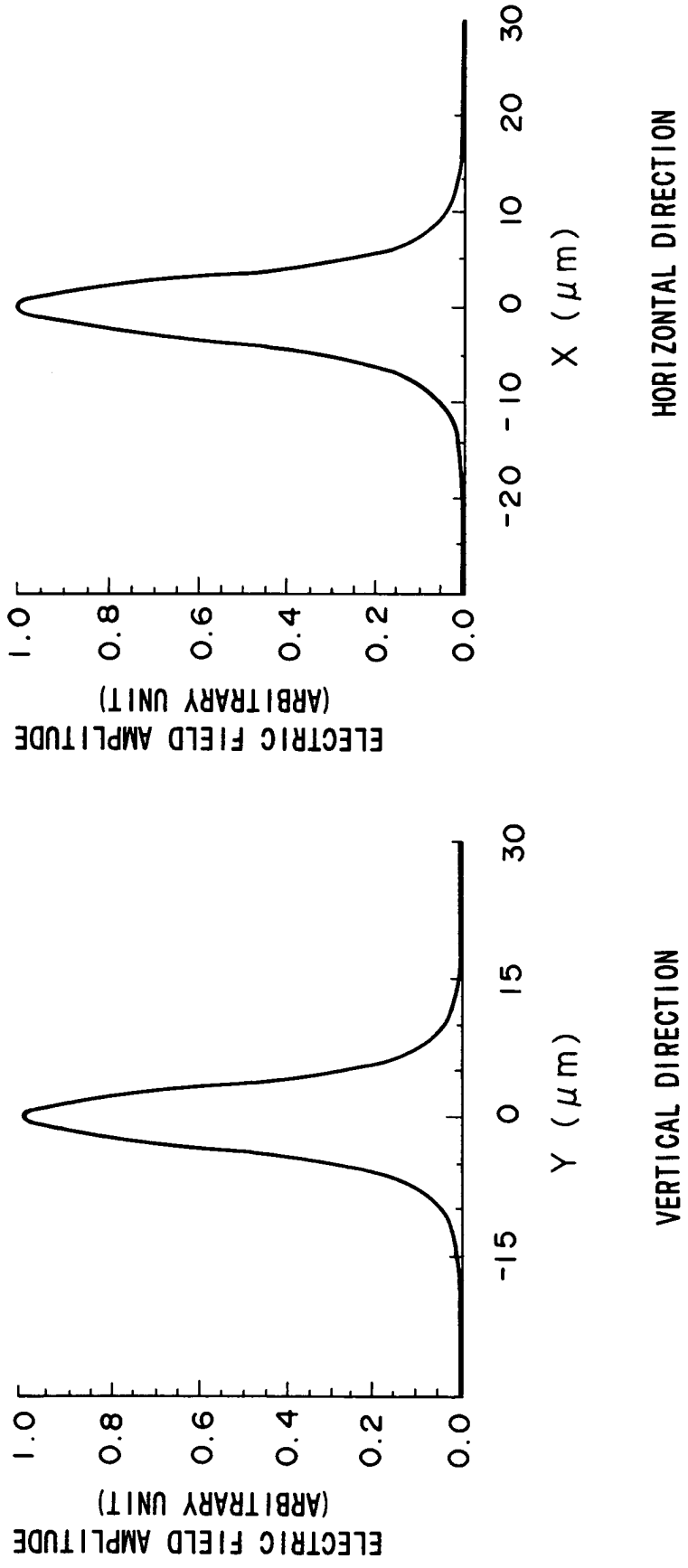

ELECTRIC FIELD AMPLITUDE
(ARBITRARY UNIT)
1.0
0.8
0.6
0.4
0.2
0.0
-15
0
15
30
Y (μm)
VERTICAL DIRECTION
ELECTRIC FIELD AMPLITUDE
(ARBITRARY UNIT)
1.0
0.8
0.6
0.4
0.2
0.0
-20
-10
0
10
20
30
X (μm)
HORIZONTAL DIRECTION

FIG.46

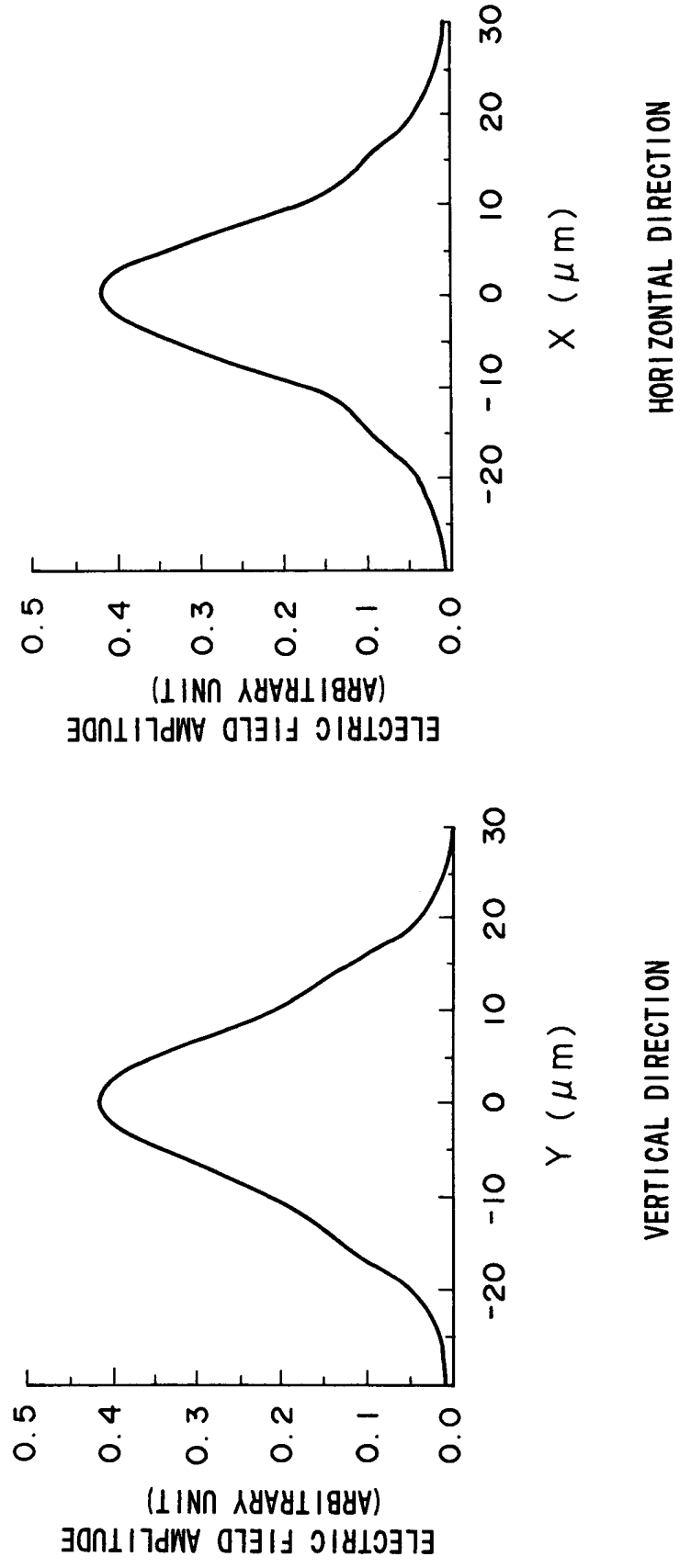

ELECTRIC FIELD AMPLITUDE
(ARBITRARY UNIT)
0.0
0.1
0.2
0.3
0.4
0.5
-20
-10
0
10
20
30
Y (μm)
VERTICAL DIRECTION
ELECTRIC FIELD AMPLITUDE
(ARBITRARY UNIT)
0.0
0.1
0.2
0.3
0.4
0.5
-20
-10
0
10
20
30
X (μm)
HORIZONTAL DIRECTION

FIG.47

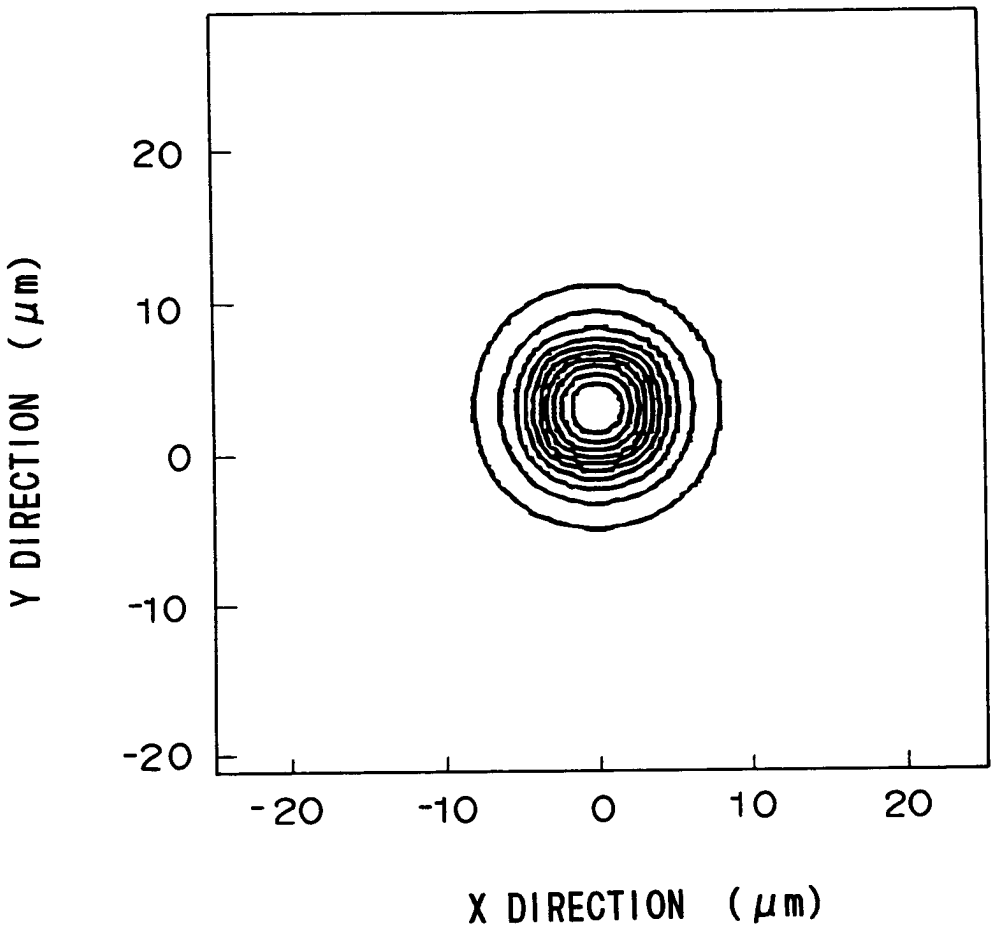


FIG.48

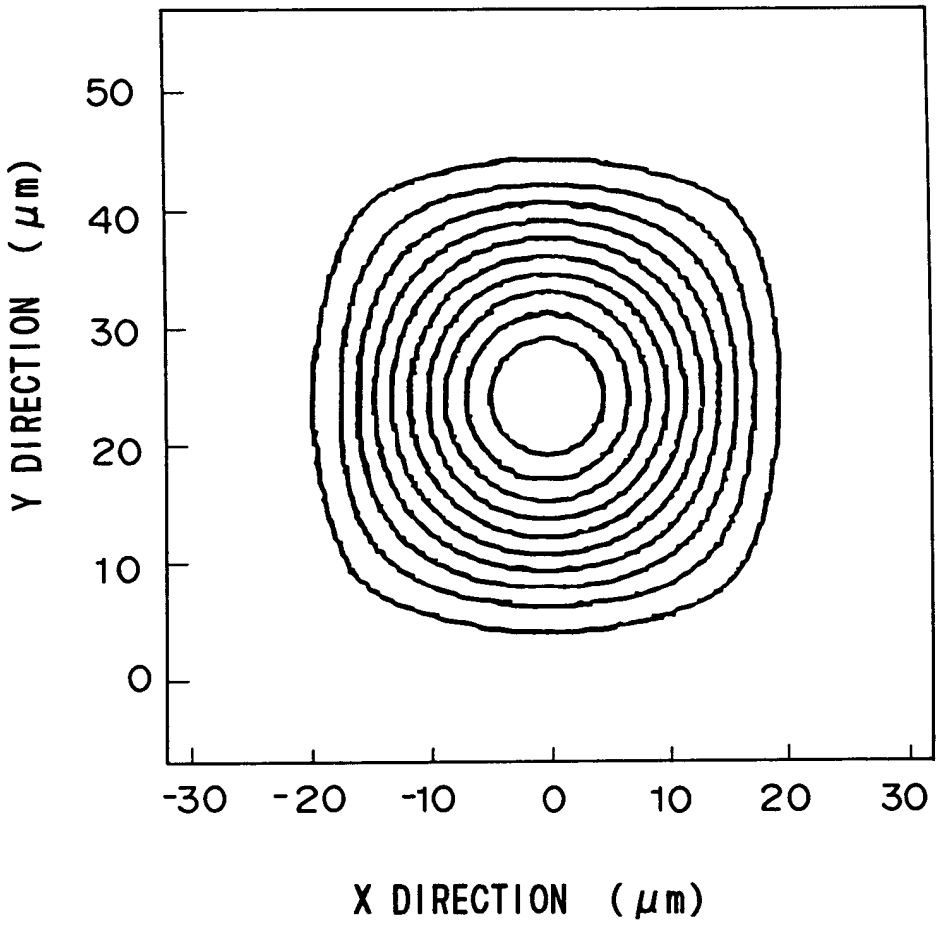
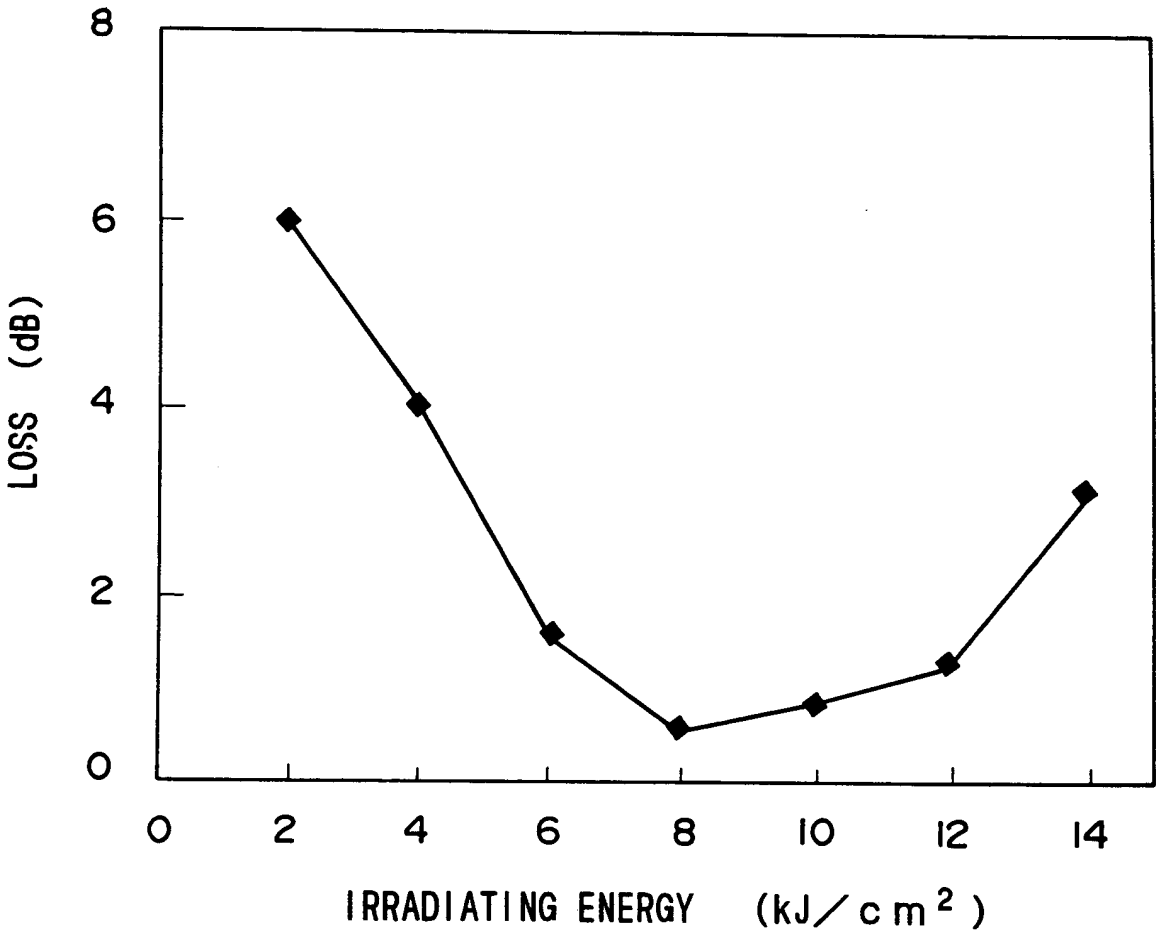



FIG.49